TASK FORCE HYDRO

HYDRO IN ONTARIO
FINANCIAL POLICY AND RATES

REPORT NUMBER FOUR

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REPORT NUMBER FOUR

REPORT TO THE EXECUTIVE COUNCIL
HYDRO IN ONTARIO – FINANCIAL POLICY AND RATES

Presented to the Executive Council
April 11, 1973

ONTARIO

COMMITTEE ON GOVERNMENT PRODUCTIVITY

TASK FORCE HYDRO

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TO HIS HONOUR

THE LIEUTENANT-GOVERNOR OF THE PROVINCE OF ONTARIO

MAY IT PLEASE YOUR HONOUR:

We, the members of the Committee on Government Productivity, appointed by Order-in-Council dated 23rd December, 1969 to inquire into all matters pertaining to the management of the Government of Ontario and requested in the Speech from the Throne dated 30th March, 1971 to review the function, structure, operation, financing and objectives of the Hydro-Electric Power Commission of Ontario, submit to Your Honour herewith a fourth report of Task Force Hydro containing their recommendations relating to the future financial policy and rates of the Hydro-Electric Power Commission of Ontario.

We have examined this report and endorse the general principles and recommendations.

Chairman

TASK
FORCE
HYDRO

Established
by the Committee
on Government
Productivity of
Ontario

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TO JOHN B. CRONYN, ESQ.

CHAIRMAN OF THE COMMITTEE
ON GOVERNMENT PRODUCTIVITY

We, the members of the Steering Committee of Task Force Hydro, appointed by the Government of Ontario to review the function, structure, operation, financing and objectives of the Hydro-Electric Power Commission of Ontario submit herewith a fourth report containing recommendations on financial policy and rates.

Mr. Frame's endorsation of the report does not extend to Recommendations 4.4, 4.6 and 4.17 from which he wishes to be disassociated.

Hugh Crothers
HUGH CROTHERS

D.J. Gordon
D. J. GORDON

R. M. DILLON

J. K. REYNOLDS

Andrew Frame
ANDREW FRAME

R. B. TAYLOR

J. D. Muncaster
J. D. MUNCASTER
CHAIRMAN

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SECTION I

INTRODUCTION

This report presents the views of Task Force Hydro on vitally important questions having to do with Hydro's future financial policies, power costing principles, and procedures for setting and reviewing electricity rates. It is based on the work of two study groups, one of which dealt with external financing, the other with issues relating to Hydro's power costing and rate philosophy. We also took into account the views of an Advisory Committee which we appointed to assess the recommendations of the two study teams and to advise us on the issues which are highly technical but which affect every power consumer in the Province. Special care was taken to ensure that the Advisory Committee included members representing all major customer groups in the Province. Membership of the Committee is shown in Appendix III.

Terms of Reference

The purpose of the External Financing Study was to examine the implications surrounding Hydro's projected plans to raise capital during the period 1971-91. Specifically we wished to assess:

- the availability of capital from financial markets,
- alternative procedures to raise this capital,
- the nature and severity of possible constraints, and strategies which Hydro might employ to deal with them.

Our terms of reference for the companion Power Costing and Rate Philosophy Study indicated that "Of all the areas of concern identified by Task Force Hydro, none seems to be of more interest or of greater urgency than the question of financial policies and power rates." Accordingly, the study team was asked to examine those facets of financial policy and practice that deal with power costing and rate setting, and specifically:

- to recommend general principles and identify alternative strategies governing Hydro's future internal financial policy with particular emphasis on power costing and rate philosophy.

Both Study Teams were directed to maintain close touch with those responsible for the Role and Place Project and the Organization Study, in recognition of the important relationship between Hydro's mandate and its organizational structure on the one hand and its financial policy on the other. As a result financial policy matters were given extensive consideration in forming the recommendations of our first two reports on Role and Place[1] and Organization[2]. (Footnotes appear at the end of each section.)

This report addresses itself to financial and rate policy within the context of the new mandate and organizational structure we have recommended for Ontario Hydro.

Background

Of the policy areas referred to in Report Number One which we feel will be of increasing significance to the government and to Hydro, the four that relate closely to the subject matter of this report are: power pricing, return on investment, stability of capital markets and discriminatory pricing. In Report Number One we described the relationship between pricing strategy and the growth of the system, and we noted that the costs that must be recovered in rates are the "lowest feasible costs" of operating the system. We chose the term "lowest feasible costs" to emphasize our contention that all identifiable environmental, social and financial costs of providing electric power should be recovered from the consumers of that power.

Hydro's financial and power costing practices are unlike those of other major public electric utilities. This uniqueness, in the main, traces back to the origins of Hydro which were based on a series of special arrangements between Hydro and the municipalities. These arrangements, embodied in the Power Commission Act of 1907 and not fundamentally modified since, were reviewed in 1967 by the Ontario Committee on Taxation (Smith Committee)[3] whose findings were then reviewed by a Select Committee of the Legislature[4].

The Smith Committee's principal interest in Hydro's financial and power costing policies was whether profits were being made which could be a possible source of tax revenue to Ontario. Three main recommendations relating to Hydro's financial policy emerged:

- The Power Commission Act be amended to define cost of power so as to be consistent with generally accepted accounting practices, and to require billing at cost plus a profit margin not exceeding a specified percentage of the cost.
- Government-owned business enterprises be made subject to income tax.
- The Province consider discontinuing its guarantee of the security issues of public enterprises such as Ontario Hydro.

With regard to sinking fund payments for debt retirement, payments into the rate stabilization reserve and payments representing the interest on the accumulations thereof, the Committee stated that these three "non-cost amounts" resulted in Hydro's charging its customers $41 million more than would otherwise have been necessary in 1965. In a subsequent section

of the Report, however, the Committee acknowledged that these charges did not result in Hydro's earning an excessive margin over operating costs.

The Committee observed that through these charges Hydro has accumulated "contributed capital" of $550 million which it used to finance the capital program and retire debt. Although the practice of crediting the debt retirement contributions back to the municipalities and rural power district as equity in the system was unusual, the Committee agreed that "the treatment given . . . reflects the concept that Hydro is at least partially a co-operative enterprise of the municipalities, the retained profits from which represent their equity".

In the opinion of the Committee, the debt retirement and rate stabilization payments had clear statutory sanction, but the case for "at least part of" the interest charged on the sinking fund and rate stabilization provisions was "less clear". The Committee favoured changing the Act to redefine these cost items and to require Hydro to charge for power on a cost plus a profit basis. The purpose was not to change the balance of internal to external financing of capital needs, which it was prepared to accept, but to ensure full disclosure of capital expenditures. The Committee agreed that Hydro should be able to plough back any resultant "profits" into the business.

The Committee stated, however, that if Hydro charged depreciation at the full rate allowed under provincial and federal tax laws, the 5-10 percent "profit" so generated would probably be offset, leaving Hydro with no taxable income.

The Committee believed that dropping the provincial guarantee on Hydro's debt would probably reduce somewhat the cost of borrowing to the Province and raise it to Hydro. Although one could not be precise about the effects of dropping the guarantee, the report concluded, at the very least it would help a bit in clearing up the "opaque waters of public finances in Ontario."

The Select Committee of the Legislature which reviewed the recommendations of the Smith Committee:

- Rejected the recommendation that the present method of costing power be changed on the grounds that, "The present system has provided Hydro with a method of generating funds for expansion and reduced capital borrowing requirements".
- Accepted the recommendation that Hydro's financial statements be changed to conform to conventional accounting principles and practices.
- Approved the recommendation that Hydro be subject to the same taxes as private corporations, but said this proposal should be reviewed after the government had had a chance to review the revised financial statements.

- Endorsed the recommendation that the provincial guarantee be dropped and said that this should be carefully implemented in consultation with representatives of principal lending institutions.

In summary, the Smith Committee proposed three changes in Hydro's financial policies and a revised system of bookkeeping. The Select Committee endorsed two of the substantive changes and the reorganization of financial statements. Recently Hydro adopted a more conventional policy on depreciation by converting to the straight-line method for all additions to fixed assets. On balance, however, the Smith Committee-Select Committee recommendations appear to have had little effect on Hydro's financial or power costing practices.

Briefs to Task Force Hydro

Several briefs submitted to Task Force Hydro dealt with financial policy, power costing and rate philosophy. Some of the points made are outlined below, to indicate the wide range of concerns and the conflicting views that were expressed.

- Concern was expressed in industrial briefs over the manner in which Hydro arrives at the cost of power. The charge was made that Hydro is "banking" customers' money by the over-generous build-up of reserves for various purposes, but especially for rate stabilization.
- Six municipal utilities called for the elimination of the practice of allowing a "return on equity", while one favoured retention. Without exception those that favoured elimination were experiencing cost increases as a result of the annual equity exchange.
- A municipal Hydro commissioner argued that "Borrowing by Ontario Hydro should not be growing by 11 percent per year. A more pay-as-you-go policy should be established".
- There were several calls for a more conventional financial structure "which would show", as one brief put it, "the profits or earnings which in reality are being accumulated".
- One brief proposed that Hydro "give consideration to issuing equity securities in the open market. . . . Tapping this source of funds could considerably ease the burden of financing in the debt-oriented market".
- Eight group submissions and one industrial submission argued that rate increases were inhibiting industrial growth and jeopardizing the economy of the Province.

- One industrial customer objected to the use of peak demand as the basis for the power rate. It was claimed that this could force industry to install its own generating equipment for use in peak periods which was in his view "economic nonsense".

- Three submissions opposed the principle of uniform geographic pricing (cost pooling) and favoured rates based on distance from the point of generation. Another industrial submission endorsed the policy claiming, "It should have the long-term benefit of spreading industrial development throughout the Province".

- Three municipal utilities expressed objections to alleged favoured treatment of power district customers. They objected that power district customers don't have to balance their accounts annually as do the municipalities, and that direct industrial customers enjoy rates lower than those offered to municipalities.

- Two individuals did not understand why rate differentials exist among municipalities claiming, "Ontario Hydro belongs to each citizen alike". Four briefs called for equalizing Hydro rates between rural and urban areas. Three municipal utilities asked that notice of increases in interim rates be given several months earlier.

- An environmental group asked that Hydro abandon its promotional rate structures.

- Several briefs called for an independent body to be established to review or to regulate Hydro's power costing and rate policies.

The Niagara Basic Power Users Committee, an association of nine power-intensive industries located in the vicinity of Niagara Falls, presented a lengthy brief and made several follow-up submissions to Task Force Hydro. Their major concern was rapidly rising power costs which have a particularly severe impact on high load factor, power-intensive industry. They argued that if no relief is granted, 7000 jobs in NBPUC plants may be jeopardized, and substantial additional indirect economic losses to the region and Province might result. The NBPUC proposed the following remedial measures, among others:

- Hydro make available blocks of energy to power-intensive industrial users at rates competitive with other jurisdictions.

- Bulk power costs be "unpooled" and a three-part rate structure (energy, demand and transmission) which recognizes proximity to points of generation be introduced.

- Five-year power contracts with agreed escalator clauses be offered to industrial customers.

- A 25-cycle power district be formed in the Niagara area with electricity rates to 25-cycle users based on actual costs of generation at Niagara Falls plus actual transmission costs to the NBPUC plants.
- The energy component of the rate charged to power-intensive users be reduced to the same level applicable to the municipal utilities, with no increase in the demand component.
- The frequency standardization charge included in rates to power intensive 60-cycle users in the Niagara region be removed, and a retroactive rebate made to refund charges unfairly levied over the years.

Each of the points raised in the briefs is dealt with in the report, in greater or lesser detail.

Footnotes

[1]Task Force Hydro, *Hydro in Ontario—A Future Role and Place*, Report Number One, August 15, 1972.

[2]Task Force Hydro, *Hydro in Ontario—An Approach to Organization*, Report Number Two, December 14, 1972.

[3]The Ontario Committee on Taxation, *Report*, 3 Vols. Queen's Printer, 1967.

[4]Select Committee of the Legislature on the Report of the Ontario Committee on Taxation, *Taxation in Ontario: A Program for Reform*, Sept. 16, 1968.

SECTION II

DEMAND FOR FUNDS AND AVAILABILITY OF SAVINGS

Estimate of Future Savings and Flow of Securities, 1971-91

Funds not raised internally by Hydro through the rate structure must be obtained from domestic or foreign savings through the placement of securities issues. Whether the savings are domestic or foreign, Hydro's demands for external funds are of vital interest to the provincial government. As a beginning, it is useful to examine what burdens Hydro's requirements will place on the future supply of domestic funds. In order to do this we estimated the flow of total gross domestic savings (TDSAV) and total gross savings (TSAV), which includes inflows of foreign savings, to 1991. This estimate was based on our forecast of Gross National Product (GNP) at market prices, and the historic relationship between GNP and these two types of savings flows. The results are shown in Table 1.

TABLE 1

FLOWS OF GROSS SAVINGS IN CANADA
ACTUAL TO 1971, FORECAST TO 1991*

		Total Gross Domestic Savings (TDSAV)		Total Gross Savings (TSAV)	
Year	**GNP $ Millions**	**$ Millions**	**% of GNP**	**$ Millions**	**% of GNP**
1950	17,955	4,055	22.6	4,370	24.3
1955	27,895	5,941	21.3	6,598	23.7
1960	37,775	7,726	20.5	8,877	23.5
1965	54,897	13,441	24.5	14,576	26.6
1970	84,468	19,650	23.3	18,535	21.9
1971	92,126	21,194	23.0	21,182	23.0
*1976	137,802	33,146	24.1	33,141	24.1
*1981	201,354	48,834	24.3	48,375	24.0
*1986	289,338	70,555	24.4	69,465	24.0
*1991	415,381	101,670	24.5	99,678	24.0
Averages for the Period					
1950-70			24.4		24.2
1960-70			22.7		24.0
1965-70			24.0		24.8

Source: Statistics Canada, *National Income and Expenditure Accounts.*

The next steps were to estimate the relationship between three-year moving averages of net total Canadian securities issues (NTSEC3) and GNP, and then to express the future flow of securities in terms of GNP, total gross domestic savings and total gross savings. These relationships are shown in Table 2.

TABLE 2

FLOWS OF NET CANADIAN SECURITIES
ACTUAL TO 1971, FORECAST TO 1991*

	Net Total Canadian Securities Issues— 3 Year Moving Average (NTSEC 3)			
Year	$ Millions	% of GNP	% of TDSAV	% of TSAV
1950	416	2.3	10.3	9.5
1955	1,475	5.3	24.8	22.4
1960	2,414	6.4	31.3	27.2
1965	3,280	6.0	24.4	22.5
1970	5,735	6.8	29.2	30.9
1971	6,613	7.2	30.2	31.2
*1976	10,222	7.4	30.8	30.8
*1981	15,237	7.6	31.2	31.5
*1986	22,180	7.7	31.4	31.9
*1991	32,126	7.7	31.6	32.2

Source: Bank of Canada, *Statistical Summary* and Bank of Canada, *Review.*

Real GNP, that is GNP measured in constant dollars, was forecast to grow at 6 percent per annum in 1972 and at a gradually declining rate thereafter levelling off at 5 percent in 1983. No attempt was made to build cyclical swings into the forecast. The rate of inflation used was 3 percent in 1972, and $2\frac{1}{2}$ percent thereafter, a rate consistent with that used to estimate projected Hydro expenditures. If the rate of inflation actually experienced should be higher, the money value both of savings flows and of Hydro's requirements for funds would increase in the same proportion, leaving the relationship between the two unaltered.

Finally, Hydro's estimated net new debt requirements were taken as a proportion of the actual and estimated savings flows and of actual and estimated securities flows, as shown in Table 3. These requirements were based on Hydro's 1970 long-range forecast of capital construction.

In order to gain an appreciation of Hydro's future capital requirements, a review was made of capital borrowing and annual costs of a number of alternative generation development programs being considered by Hydro.

TABLE 3

HYDRO'S NET NEW DEBT REQUIREMENTS IN RELATION TO FLOWS OF GROSS NATIONAL SAVINGS AND TOTAL NET CANADIAN SECURITIES ISSUES ACTUAL TO 1971, FORECAST TO 1991*

	Hydro's Net New Total Debt Requirements				Hydro's Net New Canadian Debt Requirements			
Year	$ Millions**	% of TDSAV	% of TSAV	% of NTSEC3	$ Millions	% of TDSAV	% of TSAV	% of NTSEC3
1951	135	2.8	2.5	17.3	35	0.7	0.7	—
1956	209	2.8	2.4	10.8	159	2.1	1.3	8.3
1961	109	1.4	1.3	4.3	109	1.4	1.3	4.3
1966	137	0.8	0.8	3.6	102	0.7	0.6	2.7
1970	405	2.1	2.2	7.1	230	1.2	1.2	4.0
1971	416	2.0	2.0	6.3	—	—	—	—
*1976	645	2.0	2.0	6.4	—	—	—	—
*1981	1,028	2.1	2.1	6.7	—	—	—	—
*1986	1,347	1.9	1.9	6.1	—	—	—	—
*1991	2,239	2.2	2.2	7.0	—	—	—	—

**Net of forecast debt retirement charge intended for "debt management" for the period 1972-91.

These programs are prepared on a continuing basis in order to keep abreast of technical, economic, ecological and other changes that may affect generation requirements.

Our review of these programs resulted in the decision to base the financial study on the approved long-range program in effect at the time our study was undertaken, modified to conform to more recent assumptions regarding future resource and load forecasts. This program called for new generation to be made up of approximately 63 percent fossil-fuelled plants and 37 percent nuclear by 1985.

More recent Hydro studies indicate distinct advantages in greater reliance on nuclear generation. One such study calls for approximately 48 percent of new capacity by 1985 to be fossil and 52 percent nuclear. These studies indicate a need for capital requirements as much as double the percentage of domestic savings originally estimated by Task Force Hydro. However, due to primarily to long lead times any change in program would have little impact before 1977.

The estimate of Hydro's net new debt requirements for the period 1972-91, as shown in Table 3, was based on the current dollar value of capital expenditures, changes in working capital requirements and internal cash flows.

Flows of Domestic Savings and Securities in Relation to Hydro's Requirements

Data for the period 1950-70 as shown in Table 1 indicate that the rate of domestic savings has tended to increase slightly, and that in recent years the rate of inflow of foreign savings has tended to decline. The result of these offsetting forces has been that the rate of total savings available has remained relatively stable at approximately 24 percent of GNP. Our studies indicate that the rate of total savings is likely to continue at about this level to 1991. Our estimate of savings flows implies also that Canada will not on balance be importing much capital from abroad in the next 3 to 4 years, and none at all after the mid 1970's. This is a highly tentative conclusion the implication of which we shall refer to again.

Table 4 expresses Hydro's estimated net new debt requirement as a percentage of available savings and total Canadian securities issues. The following points are worth noting:

- Hydro's financing needs over the 1972-91 period will be substantially higher in relation to available savings than they were in the period 1951-70. However, the share of total securities issued by Canadian borrowers accounted for by Hydro issues may decline slightly. If it turns out that, contrary to our assumption, the rate of domestic savings does not rise to offset the decline in foreign capital inflows, the stress on Hydro financing will be increased.

- While Hydro's demand for funds will be relatively higher in the period 1972-91 than in 1951-70, it may not be relatively higher than in the period 1951-59, the period 1960-70 having been one of relatively low requirements. Even if the more conservative estimate of savings for 1972-91 is used, Hydro's share will be lower than the 2.4 percent that prevailed during the period 1951-59.

- In order to meet its future financial requirements Hydro must obtain a share of available savings and total securities issues at least equal to the share obtained in 1970 and 1971.

And finally, as we have already pointed out, it is important to recognize the effect of long-range construction plans on all these calculations. For example a decision to alter these plans to include a higher proportion of capital-intensive nuclear generating plant could drastically increase estimated capital requirements.

Provincial Demand for Funds

Hydro's ability to meet its financial requirements will depend not only on the available supply of funds but also on the demand for these funds by the

TABLE 4

SUMMARY OF HYDRO'S FINANCING NEEDS IN RELATION TO FLOWS OF SAVINGS AND OF NET NEW CANADIAN SECURITIES ISSUES ACTUAL TO 1971, FORECAST TO 1991*

Averages for the Period	Hydro's Net New Debt Requirements As a Percentage of: TSAV	TDSAV	Net Total Canadian Securities Issues
	(%)	(%)	(%)
1951-70	1.6 (1.1)**	1.7 (1.2)**	6.7 (4.6)**
1951-59	2.4 (1.7)	2.6 (1.9)	11.1 (7.8)
1960-70	1.0 (0.7)	1.1 (0.7)	3.7 (2.5)
1965-70	1.2 (0.6)	1.2 (0.6)	4.2 (1.9)
1970	2.2 (1.2)	2.1 (1.2)	7.1 (4.0)
1971	2.0	2.0	6.3
Forecast			
*1972-91	2.0	2.0	6.4
*1972-81	1.9	1.9	6.3
*1981-91	2.0	2.0	6.4

**Net new Hydro issues *sold in Canada* as a percentage of savings and securities flows.

Ontario Government and the rest of the economy. In the capital market no essential distinction is made between the credit standing of Ontario Hydro and that of the Ontario Government because the latter guarantees the bonds of the former.

Table 5 summarizes the borrowing requirements of the Ontario Government over the period 1951-73 and indicates that the Province began to increase its share of total savings after 1965. However, well over 50 percent of the Province's increased requirements have been met through Canada Pension Plan loans since 1967.

In 1972 borrowings increased substantially to 4.1 percent of gross savings and a similar figure appears likely to emerge in 1973. There is no way of foretelling whether the high 1972 and 1973 figure will be maintained.

While uncertainty concerning future provincial government fund requirements makes it difficult to arrive at firm conclusions, it would seem that the Province will require as high or higher a proportion of the nation's savings in the 1970's as in the 1960's. So whereas from 1960 to 1970 Hydro and the

TABLE 5

BORROWING REQUIREMENTS OF ONTARIO GOVERNMENT ACTUAL TO 1972, FORECAST TO 1973*

	Net New Debt Requirements		
Averages for the Period	$ Millions	% of Total Gross Savings	% of Net Total Canadian Securities Issues
1951-70	168.8	1.4	5.4
1951-59	71.9	1.0	4.7
1960-70	248.1	1.7	5.2
1965-70	359.3	2.1	7.4
1971	641.0	3.0	9.7
1972	984.2	4.1	6.1
*1973	1,017.6	3.9	6.2

Source: Ministry of Treasury, Economics and Intergovernmental Affairs, Government of Ontario.

Province together used net new funds equal to about 2.7 percent of total gross savings, the outlook for the period 1972-91 is a substantial increase to something like 4.5 percent or 5 percent.

The impact of an increased provincial demand for funds on Hydro's ability to finance its requirements through external borrowing will be mitigated to some extent if the Province is able to meet most or all of its requirements through the Canada Pension Plan or internally generated funds. Our studies suggest that, at least until 1979, these sources will provide adequately for the net requirements of the Province. However, if a higher level of provincial requirement is assumed, say equal to the peak level of 3.0 percent of total gross savings reached in 1968 and 1971, then the Province would need to re-enter the market beginning in 1977. If the 1972 and 1973 ratios were to hold in future then the Province would become a persistent borrower of market funds.

Unfortunately these data do not provide much guidance as to the likely impact of the Ontario Government demands on the securities market. If the Province reduces its current deficit and its current share of total savings to the level experienced a few years ago, then its financing should not pose problems for Ontario Hydro since it would not need to go to the market for net funds until about 1980. But if its present relative demand for savings persists, it will be competing with Hydro for market funds. Uncertainty in the whole area is compounded by the fact that our estimates of the Province's future flows of internal funds and of Canada Pension Plan funds can only be regarded as rough approximations and may, for various reasons, prove to be unreliable.

The Demand for Funds From Other Sectors

It is difficult to forecast surges of capital expenditure in various sectors of the economy over the next two decades and their effect on Hydro's financing requirements. Table 6 shows the average ratio of capital spending in Canada to GNP in both current and constant dollars for overlapping periods from 1954 to 1972. The data summarized in Table 6 show that the present level of capital expenditures is marginally below its trend value, and well below the levels achieved in periods of rapid expansion such as 1955-57 and 1964-67. Therefore, it is reasonable to believe that the next several years will see accelerating capital spending which will generate a greater demand for funds.

TABLE 6

CAPITAL EXPENDITURES AS A PERCENTAGE OF GROSS NATIONAL PRODUCT 1954-72

Averages for the Period	Current Dollar Data	Constant Dollar Data
	%	%
1954-71	22.9	22.7
1954-60	24.2	23.6
1961-71	22.0	22.1
1972*	21.5	20.9

*Estimate.
Source: Statistics Canada, *National Income and Expenditure Accounts.*

Current public discussion about the emergence during the next decade of huge gas and oil pipeline projects and other resource-oriented enterprises, has led to speculation, that there will be a permanent increase in the demand for savings. However, an analysis of past capital stock and output data leads us to conclude that capital/output ratios will probably not rise permanently, although there may be short-term cyclical increases. Should individual large projects pose financing problems for the Canadian market, they will almost certainly be financed without great difficulty with foreign capital because of their inherent financial attractiveness. So while Hydro must expect some cyclical acceleration in the demand for credit in other sectors, it need not necessarily assume that there will be acceleration in the relative demand for credit in total, or that major resource-oriented projects will seriously impair its position in the Canadian capital market.

Availability of Foreign Savings

In the 1965-70 period 54 percent of Hydro's net new debt was placed abroad, compared with 22 percent for Canadian borrowers as a whole. During the

longer period 1951-70 Hydro's foreign borrowings amounted to only 35 percent of its net new debt. Looked at another way, in the 1965-70 period, its issues in Canada amounted to 0.6 percent of domestic savings available, compared with 1.9 percent in the earlier period of heavy financing, that is 1951-59, and even in 1970 it had reached a level of only 1.2 percent (Table 4, page 11). This suggests that Hydro borrowed larger amounts abroad than was absolutely necessary, probably to achieve lower borrowing costs, with the result that the Canadian market for Hydro securities may not have been developed to the fullest extent possible.

If we are correct in our assumption that there will be no significant net inflow of foreign savings, on balance, in the 1971-91 period, then it will be necessary for Hydro to shift most or all of its foreign financing to the domestic market. If it did not do so, Hydro could find itself in the unfortunate position of having to go abroad for funds at a cost (including interest and exchange risk) higher than that encountered by comparable borrowers in Canada. It is to be noted in this connection that a narrowing or disappearance of net foreign capital inflows (i.e., disappearance of the net current account deficit on the balance of international payments) could mean a narrowing of the gap between Canadian and U.S. (or German and Swiss) interest rates.

Even if there were to remain an interest rate incentive for Hydro to obtain a substantial portion of its funds in the United States market, it is less certain now than it was in the past that that market will be available to Hydro. The risk of government interference in fund flows is probably greater than it was. The Canadian government is exercising considerable moral suasion in detering Canadian borrowing in New York. If the U.S. does not quickly reverse its balance of payments deficit it may be induced to place controls on foreign borrowing, including extension of the interest equalization tax provision to include Canadian issues. However, both Western Europe and Japan may have funds for foreign investment because of the strength of their balance of payments positions.

It should be noted that a shift by Hydro to Canadian sources of funds should be possible if our savings projections are correct, provided that Hydro and its underwriters take appropriate steps. We have estimated that total savings will run at about 24 percent of GNP from 1971-91, about the same as in the past, with a decline in foreign savings inflow offset by an increase in domestic savings. However, for Hydro to obtain its share of those savings at minimum cost might well require improvements in procedures for placing Hydro issues in Canada and in the nature of Hydro securities being offered. In addition Hydro may have to increase its internally generated funds, an option we will examine in the next section. If our more conservative savings estimates are used, then the need for such improvements would be even greater.

Conclusions

Hydro's demand for savings in the next two decades will be higher relative to funds available than in the 1951-70 period. Hydro must also expect that other sectors of the economy will increase their relative demand for funds in the next several years. Both factors could complicate Hydro's financing problems. At the same time it is possible that the Province will not have to issue securities in the market for its own financing purposes until late in the 1970's, and that it may even be able to reduce its debt in public hands. But this cannot be depended upon since it would require the Province to reduce its relative demand for savings from its current level.

Taken together these facts suggest that in order to satisfy its demand for funds, Hydro may have to re-examine its internal financing policy and its policy with respect to the design, the mix and the marketing of its securities in Canada.

SECTION III

FINANCIAL POLICY AND RATE OF RETURN

Financial Objectives for Hydro

Before considering a financial policy for Hydro, we have attempted to define some financial objectives which stem from the role and place for Hydro recommended in Report Number One. We believe that these objectives should be based on the proposition that Hydro should strive to remain at arm's length from Government in matters of financial policy to the degree that this is possible having regard for such matters as the Provincial guarantee of its debt and the necessity to comply with Provincial fiscal policy.

The following specific financial objectives are suggested:

- To finance capital facilities at the lowest cost consistent with financially sound operation. This is a natural concomitant of Hydro's continued goal to "meet the demand for electricity in Ontario at the lowest feasible cost".
- To allocate the cost of its capital facilities equitably between present and future customers.
- To manage financial reserves so as to achieve a reasonably smooth rate of change in bulk power charges.
- To maintain a level of liquidity appropriate to the attainment of the above objectives.

Delineation of these objectives leaves major questions unanswered. In what terms, for example, can the effects of overall policy be measured? Are the reserves really needed? Should they be fully funded? And so on. The answers to these questions are likely to emerge most clearly by concentrating on the total cash flows arising from depreciation, debt retirement and other reserve charges, and the long-term impact of these flows on the financial position of the Corporation. Only in relation to such an overview does it become possible to examine the adequacy of the individual components of the cash flow.

Internal vs. External Financing, 1951-91

A key issue of financial policy is the proper balance between internally and externally generated funds. Is it less expensive for Hydro's customers, taken as a whole and over the long term, to pay for assets now out of rates, or is it better to borrow relatively more now, to pay for these assets over a longer period of time, and to charge customers with interest on the borrowed money?

At first blush, one might conclude that a policy of borrowing rather than paying "cash down" for new capital assets would always result in higher costs to customers over time. For two reasons, this need not necessarily be the case:

- A number of factors affect the least-cost financing mix, i.e., the relationship between debt financing and internally generated funds. One fundamental factor is the relationship between the rate of growth of capital requirements and the carrying charges (principal and interest) on debentures. This point is considered further in Section V.
- Capital contributions from Hydro's customers should not be considered to be interest free. Unless it can be shown that their involuntary investment in Hydro's system provides a yield at least equivalent to that obtainable elsewhere, such a diversion to Hydro's capital program will result in a net economic loss to society. This point was made forcefully by a number of industrial briefs to Task Force Hydro.

If present financial policies were continued, the mix of external and internal funds to meet the requirements of Hydro's long-range forecast of capital construction to 1991 would be as shown in Table 7. The following points should be noted:

- The portion of Hydro's net financial requirements to be met by new debt issues from 1972-91 will be somewhat greater than over the past two decades. In the 1972-81 period, however, the dependence on external funds relative to internal funds will be much higher than the average over the last two decades, although comparable to that for the fifties.
- There is a change in the composition of internal funds in the 1972-81 period compared with that for the 1951-70 period. The frequency standardization charge and provincial grants disappear entirely, but are approximately offset by an increase in depreciation charges, with the relative size of debt retirement charges remaining the same. The increased depreciation flows are the result of a decision effective January 1, 1971 to introduce the "straight-line" method of depreciation for all new power supply facilities. All other assets in service at the end of 1970 continue to be depreciated on the sinking fund basis as previously employed.

The question now arises as to whether the current external-internal financing balance is the best way to meet future requirements. Since we assume that all external financing will be debt financing and all internal financing will be "equity" financing, the question could be reworded in terms of what constitutes an optimum debt/equity ratio or, alternatively, an optimum capital structure.

We note that Ontario Hydro's current financial policies forecast an increase in the debt/equity ratio from its present level at a rate of approximately 1 percent per year. Table 8 sets out Hydro's historical and forecast debt/equity ratio assuming a recent capital program and no change in financial policies.

TABLE 7

HYDRO'S INTERNAL AND EXTERNAL SOURCE OF FUNDS
ACTUAL TO 1971, FORECAST TO 1991*
(PERCENTAGES)

External Funds		Internal Funds and Grants				
Averages for the Period	New Debt Issues Net	Debt Retirement Charge	Depreciation	Frequency Standardization Charge	Provincial Grants	Total Internal Funds and Grants
1951-70	61.8	14.0	15.5	7.1	1.7	38.2
1951-55	71.7	9.4	8.7	5.6	4.7	28.3
1956-60	67.2	12.3	12.0	7.2	1.2	32.8
1961-65	44.0	21.7	23.0	10.9	.4	56.0
1966-70	64.1	12.7	18.2	4.7	.3	35.9
1971	68.6	10.1	17.5	3.5	.4	31.4
*1972-91	63.7	13.0	23.4	.3	—	36.3
*1972-81	67.6	11.3	21.6	.7	—	32.4
*1982-91	59.9	14.7	25.3	—	—	40.1

TABLE 8

DEBT/EQUITY RATIOS UNDER CURRENT FINANCIAL POLICIES
ACTUAL TO 1971, FORECAST TO 1977*

Year	Debt/Equity	Year	Debt/Equity
1962	73:23	1970	76:24
1963	76:24	1971	77:23
1964	76:24	1972	78:22
1965	75:25	1973*	79:21
1966	75:25	1974*	80:20
1967	75:25	1975*	81:19
1968	75:25	1976*	82:18
1969	75:25	1977*	83:17

An Optimum Capital Structure

In the abstract, an optimum capital structure is one that minimizes the unit cost of capital. When a private corporation first introduces debt into its capital structure, it may generally be presumed that its total cost of funds will decline. This is because the cost of debt capital does not include an allowance for the shareholders in compensation for the risks they take when putting up

equity capital. However, when a company's debt/equity ratio rises to a certain level, its credit rating will begin to suffer, its incremental cost of borrowed funds will begin to rise with the result that its average unit cost of funds will begin to move upward. The point at which the unit cost of funds begins to rise marks the optimum capital structure.

The optimum structure, in practice, cannot be determined with mathematical precision, but requires personal judgement based on the experienced opinion of underwriters, brokers, financial counsellors and financial managers. And the optimum point will differ between industries and even between companies in a given industry and, over time, even in a single company.

Now to what extent is this general approach useful in considering Hydro's problem of achieving an appropriate division between internal and external financing? First, it would seem that in spite of the close relationship between Hydro and the Province of Ontario, investors do not regard Hydro bonds as completely riskless investments. This in turn implies that there is some role for equity capital as an "absorber of risk" and that the "cost" of such capital, except at very high debt/equity ratio levels, should be regarded as being at least as high as, say, the yield on Ontario Government bonds. The risks are numerous. Exceedingly unsettled capital market conditions might impair Hydro operations in a very costly way and internal funds are a protection against such an eventuality. Political uncertainty in the Province could cause investors to be uncertain over the value of the government guarantee. The need for funds by Hydro might accelerate ahead of the willingness, because of inertia or outmoded "rules of thumb", to meet those needs.

While the presence of risks justifies some use of internal funds, such funds should not be used beyond the point where those risks are adequately covered. Except at very high debt/equity ratio levels, internal funds should be regarded as being at least as costly as borrowed funds, because as we have said, internal funds are essentially forced investments and those supplying them do not have any choice in the matter. Borrowed funds, on the other hand, are supplied voluntarily and those supplying them are able to disinvest before maturity of the debentures. The "excessive" use of internal funds should be avoided since it may not only be costly, but as we earlier indicated it would also diminish the efficiency of capital allocation. On the other hand, since the existing generation of customers does enjoy the benefits of capital contributions made by previous generations, it seems logical that today's customers should be asked to make some contribution for the benefit of future customers.

Keeping in mind that funds generated internally are not interest free and that borrowings should normally be the preferred source of funds, we recommend that:

> ***4.1 The mix of internal and external funds be established with the objectives of minimizing the cost of capital over the long term.***

Credit Standing

There is a strong feeling among underwriters that if Hydro markedly increased its share of capital market financing it would run the risk of impairing its credit standing and therefore would face higher interest costs.

This is not necessarily to argue that Hydro cannot borrow a larger proportion of capital market funds than in the past decade. In the first place, it may not have fully exhausted the potential of its credit standing in the past, and further, it might be able to improve the attractiveness of the securities it offers.

The question is whether the relative increase we are forecasting in Hydro's borrowings will cause any deterioration in its credit standing and that of the Province. Our studies indicate that the average of provincial bond yields has risen substantially more since 1965 than have Government of Canada bond yields. This is also true for municipal and corporate yields and conventional mortgage rates, and so a deterioration of Ontario Government bond yields relative to Canada yields says little about the credit standing of the former.

Nor does a comparison of Ontario yields with an average of all other provincial bond yields give clear evidence of a relative deterioration of Ontario yields when the whole of the post-war period is examined. It is true, however, that in the first quarter of 1972 the ratio of Ontario yields to the all-provincial average stood at 98.1 which was higher than the figure for all but seven of the 24 post-war years (to 1969). So Ontario bond yields in 1972 may have begun to reflect pressures of financing which, if not checked, could lead to a basic change in Ontario's credit standing. But on the basis of such short experience this must obviously be regarded as a tentative observation. Nonetheless it would be prudent to pursue a financing policy that would prevent Ontario bond yields deteriorating further relative to those of provincial yields in general.

In view of this situation and the present trend in Hydro's debt/equity ratio we see a need for Hydro to adopt a financial policy which will protect its current credit standing.

We therefore recommend that:

> ***4.2 Hydro take whatever steps are necessary to prevent any further increase in its debt/equity ratio.***

It is impossible in practice to determine at what point Hydro's credit standing would begin to suffer. The change could come gradually as the demand for funds increased, or it could come swiftly at some specific level of borrowing. Market judgements of credit standing are exceedingly complex and so a prudent course for Hydro might be not only to ensure that its debt/equity ratio does not rise but that it actually is reduced.

Rate of Return

The capacity of assets to yield a return is important in the determination of both the economic and financial performance of an enterprise. In economic terms, the return on investment or rate of return is a common indicator or measure of the efficiency with which capital resources are employed. In financial terms, it is a measure of the financial viability of an enterprise indicating its capacity to sustain the capital employed. As such, it is an important factor in assessing credit standing. It is applicable to any enterprise engaged in raising, investing or lending funds, whether investor-owned or public, taxable or non-taxable. The return on investment is most commonly termed "rate of return" when used in the context of rate regulation. In the evaluation of new investment alternatives, when the interest is in anticipated or required returns, it is referred to as the discount rate.

Ontario Hydro has always earned a return on its assets. It has however, never expressed this return specifically as a "rate of return" nor used it explicitly in assessing its financial viability or economic performance. This in future it should do since rate of return is the most all-inclusive and generally accepted single indicator of financial performance and is in this respect superior to debt/equity ratios and other measures now employed.

Calculation of rate of return

Before proceeding, it is necessary to define our terms. The "net return" consists of the operating surplus left over after deducting the expenses of operating and maintaining the system, which are defined to include depreciation but not interest on outstanding debt. The rate of return is the return divided by the "asset base" or "rate base", which is the depreciated value of the assets employed by the enterprise including working capital.

Ontario Hydro has always had an operating surplus consisting of the sum of interest costs, debt retirement charges and credits to reserves. Debt retirement charges have been set specifically by legislation while reserve charges have generally been related to cost stabilization and have been established by the Commission under broad enabling legislation. The level of interest costs has been determined by Hydro's financing policies and its standing in the capital markets.

For the purpose of this report and for a broad examination of these achieved returns relative to other organizations we have calculated Hydro's rate of return on net assets for 1971 as illustrated in Table 9. The method used can be misleading due to interest cost and income allocation in both Ontario Hydro and other organizations, particularly in relation to the return on equity capital. Whereas the calculation is considered valid for present purposes, greater precision and definition would be required before a specific target or objective return was established as a matter of policy.

TABLE 9
CALCULATION OF
ONTARIO HYDRO'S RATE OF RETURN, 1971
($ Millions)

	1971[1]	1971 Adjusted[2]	
Return			
Interest	129.1	138.7	
Debt retirement charge	52.5	52.5	
Increase in rates stabilization reserve	1.8	1.8	
	$183.4	193.0	
Rate Base (assets employed)			
Plant at cost	$5,062.4		
Less: Plant under construction	762.6		
Operating assets		$4,299.9	
Less: Accumulated depreciation	762.1		
Province contributed capital	126.7	888.8	
		$3,411.1	
Plus: Allowance for working capital (inventory, cash, coal, etc.)		200.9	
Total rate base		$3,612.0	
Rate of Return (net)			5.3%

[1]per Financial Statements.
[2]Adjustment relates to interest allocated to expense accounts.

Hydro's historical and forecast rate of return calculated on the same basis and compared to the average cost of outstanding debt is set out in Table 10.

In 1971, Hydro's rate of return fell to 5.3% which was below the average cost of debt outstanding for the first time in many years. This came about both for technical reasons associated with application of financial policy and the very low net addition to the stabilization of rates and contingencies reserve in that year. Revisions to financial policy at that time reversed the downward trend and the rate of return is forecast to reach about 7.6 percent by 1977. These increases were, to some extent, counteracted when a rate increase sought by Hydro to be effective on January 1, 1972 was delayed. This further reduced the rate of return for 1972 to 5.1 percent.

Rate of return as an index of financial performance

From Hydro's point of view rate of return is most useful as an index of Hydro's financial policies and the degree to which its financial practices reflect its financial objectives. Such an index is a necessary part of the more flexible financial management we favour for Hydro and which complements the

TABLE 10

HYDRO'S RATE OF RETURN UNDER CURRENT FINANCIAL POLICIES ACTUAL TO 1971, FORECAST TO 1977*

Year	Rate of Return	Cost of Outstanding Debt	Year	Rate of Return	Cost of Outstanding Debt
	(%)	(%)		(%)	(%)
1960	5.3	4.1	1969	6.3	5.3
1961	5.1	4.1	1970	6.0	5.8
1962	4.5	4.2	1971	5.3	6.0
1963	4.3	4.3	1972*	5.1	
1964	4.6	4.4	1973*	6.3	
1965	4.9	4.4	1974*	6.8	
1966	5.5	4.5	1975*	6.9	
1967	5.3	4.7	1976*	6.6	
1968	5.6	4.9	1977*	7.6	

proposals we will be making to relax statutory limitations on reserves and debt retirement funds. We therefore see a need for some convenient means of financial constraint within which Hydro can manage its financial affairs. But one must, at the same time, be conscious of the effect of such a constraint on the trend in debt/equity ratios and cash flows.

Rate of return and debt/equity ratio

If the current debt/equity ratio were stabilized as we have recommended, the effect on the rate of return would be as shown in Table 11. By 1977 the resulting rate of return would be 0.7 percentage points higher than that forecast under current financial policy.

TABLE 11

RATE OF RETURN AND DEBT/EQUITY RATIO TO 1977

	Under Current Financial Policies		Assuming Stabilized Debt/Equity Ratio	
	Debt/Equity Ratio	Rate of Return	Debt/Equity Ratio	Rate of Return
		%		%
1972	78:22	5.1	78:22	5.1
1973	79:21	6.3	79:21	6.1
1974	80:20	6.8	79:21	7.8
1975	81:19	6.9	79:21	8.1
1976	82:18	6.6	79:21	7.7
1977	83:17	7.6	79:21	8.3

Should it be decided that Hydro's current debt/equity ratio be reduced, according to our calculations an increase in the rate of return on net assets of 1 percentage point would reduce the debt/equity ratio to about 64:36 in 20 years. This debt/equity ratio would still be higher than that of private electrical utilities in the United States and of the gas utilities in Canada, although it would be lower than that of most publicly owned electric power utilities in Canada and Britain.

Rate of return and the need for external funds

Table 12 shows additional internal funds that Hydro would have available if it were to increase its rate of return by 1 percentage point, assuming that the demand for power would not be substantially affected by the resulting higher prices. Such an increase in rate of return would raise $2.3 billion from 1972 to 1991 which would permit a 10.5 percent reduction in net Hydro debt issues.

Table 12 also shows the impact of the additional 1 percent return on Hydro's net new debt requirements as a percentage of TDSAV and on net new securities issues in terms of NTSEC. It is noted that this 1 percentage point increase in rate of return is insufficient to reduce Hydro's net new debt requirements to the 1951-71 level of 1.7 percent of TDSAV as shown in Table 4, page 10.

Impact on price

In calculating the impact of an increase in rate of return on power prices, it is important to recognize that the increase experienced during the first year remains unchanged in succeeding years providing the rate of return remains constant. In other words the effect of an increase on rate of return does not grow exponentially in succeeding years as is the case with increases due today to rising operating costs.

We have calculated that a 1 percentage point increase in rate of return would result in an increase in the cost of bulk power, over and above that arising from increased operating costs, of about 5 percent. This means that over the period 1972-77 the increase in rate of return shown in Table 10 could by itself raise bulk power rates an average of 2.5 percent per year. Compared to this, rising fuel costs alone increased rates by about 2.7 percent in 1971.

Rate of return—an economic perspective

If the average rate of return being achieved by companies in a given industry is below that of companies in a comparable industry, then those companies within the first industry may be regarded as operating in an economically inefficient manner. This inefficiency takes the form of over-use of real resources. Such over-use can arise because unit costs are too high, in which case the company due to inefficient operations is using too many resources to produce a given output. Alternatively, it can arise because unit output prices

are too low, and the company may be producing more output than it should, since at lower prices, demand will be greater than at higher prices.

It should be emphasized that in a monopoly or semi-monopoly situation earning an appropriate rate of return is not a proof of operating efficiency. Operating efficiency can be assisted only through the application of a range of organization design criteria such as those discussed in Report Number Two. Nevertheless, rate of return can be a real stimulus to greater cost effectiveness throughout Hydro—if it is remembered that reduced operating costs can lead to greater operating surpluses, which result in higher realized rates of return. The company then has the option of reducing its dependence on borrowed funds or of lowering rates.

TABLE 12

IMPACT ON SUPPLY OF INTERNAL FUNDS AND DEMAND FOR EXTERNAL FUNDS OF INCREASING HYDRO'S RATE OF RETURN BY 1%, 1972-91

IMPACT ON SUPPLY OF INTERNAL FUNDS

Year	Net Plant in Service	Additional Internal Funds Raised
	($ Millions)	($ Millions)
1972	3,814	38
1977	6,955	70
1982	10,749	107
1987	16,618	166
1991	23,813	238
Total 1972-91		2,315

IMPACT ON DEMAND FOR EXTERNAL FUNDS

Hydro's Net New Debt Requirements as a Percentage of TDSAV

Averages for the Period	Assuming Planned Rate of Return	Assuming Return Increased by 1%
1972-91	2.0	1.8
1972-81	1.9	1.8
1982-91	2.0	1.8

Hydro's Net New Issues as a Percentage of NTSEC

Averages for the Period	Assuming Planned Rate of Return	Assuming Return Increased by 1%
1972-91	6.4	5.7
1972-81	6.3	5.8
1982-91	6.4	5.7

To the owners and creditors of a business enterprise, the relevant rate of return would be the "private rate of return" or net operating return after taxes. However, from the standpoint of society in general, including owners and creditors, the concept of "social rate of return" or net return before taxes is more significant.

Since taxes affect prices and prices affect resource allocation, it is desirable to compare the return on Hydro assets not just with the return on assets of comparable non-taxable corporations, but also with the return on assets of Hydro's tax-paying competitors in the energy sector and in the capital markets.

Details of Hydro rates of return on net plant in service and that for other enterprises are shown in Table 13.

- The average gross operating return (unadjusted) for Hydro from 1965 to 1970 was 7.4 percent. This was lower than that for seven of the eight comparable large public and investor-owned utilities which averaged 10.0 percent over the six-year period.
- Hydro's average net (unadjusted) operating return for the period 1965-70 before income tax was 5.2 percent, again below that of the other electric utilities and substantially below the gas utilities and Bell Telephone. Present Hydro plans, as shown by Table 10, page 23, call for an increase in operating return for the 1972-77 period which will partially correct this disparity.
- As noted earlier, it is advisable to compare Hydro rates of return with those for organizations in the private sector on a before income tax basis. When this is done, it is apparent that both past and forecast Hydro rates of return stand below those of the gas companies.

It may be argued that a policy of increasing the rate of return and therefore the price of electricity runs counter to Hydro's traditional "power at cost" policy. However, it should be recognized that if Hydro is operating efficiently but nevertheless is not earning a competitive rate of return on its net assets then it is actually pursuing a "power below cost" policy. This has come about through not imputing an appropriate interest cost to funds generated internally. So in economic terms, adoption of a rate of return policy does not violate the "power at cost" concept.

Some briefs to Task Force Hydro made the point implicitly that there are external benefits to subsidizing the cost of power by, for instance encouraging industrial growth or regional development, and that such benefits justify perpetuating a "power below cost" policy. As we pointed out in Report Number One, in the early days of Hydro, when the use of hydro-electric power in the Province had not yet been fully exploited, substantial benefits derived from Hydro's efforts to promote the use of electrical energy. But in a mature

TABLE 13
RATES OF RETURN ON NET PLANT IN SERVICE, 1965-70

	Averages for the Period 1965-70
A—AFTER INCOME TAX	(%)
Gross Operating Return[1]	
Tennessee Valley Authority	6.5
ONTARIO HYDRO	7.4
Quebec Hydro	8.6
B.C. Hydro	8.9
Calgary Power	10.0
Central Electric Generating Board (Britain)	10.5
Consumers' Gas[2]	10.5
Union Gas[3]	11.9
Bell Canada	12.7
Average (excl. Hydro)	10.0
Net Operating Return[4]	
T.V.A.	3.4
ONTARIO HYDRO	5.2
Quebec Hydro	6.5
B.C. Hydro	5.8
Calgary Power	6.5
C.E.G.B.	5.3
Consumers' Gas	8.0
Union Gas	9.1
Bell Canada	6.4
Average (excl. Hydro)	6.4
B—BEFORE INCOME TAX	
Gross Operating Return[1]	
ONTARIO HYDRO	7.4
Consumers' Gas	12.4
Union Gas	15.6
Average (excl. Hydro)	14.0
Net Operating Return[4]	
ONTARIO HYDRO	5.2
Consumers' Gas	9.9
Union Gas	12.8
Average (excl. Hydro)	11.4

[1]For Hydro this includes depreciation, debt retirement and stabilization charges and for the other institutions it includes similar charges. Both are before adjustments for cost allocation, etc.

[2]Consumers' Gas uses flow-through basis for accounting for income tax on utility operations and deferred tax basis for non-utility operations.

[3]Estimated on a flow-through basis.

[4]Excluding depreciation.

economy such as is now enjoyed in Ontario there is no longer justification for encouraging consumption through subsidized rates. An example of the danger of such a practice has recently been drawn to our attention. In Britain increased consumption of electricity has been attributed to a Government denial of a rate increase sought by the Central Electricity Generating Board (C.E.G.B.) to maintain its target rate of return, coupled with the successful efforts by the retail distribution boards to market electrical appliances. This increased consumption has resulted in an uneconomic demand for additional generating capacity.

A rate of return for Hydro

We have discussed the concept of rate of return from Hydro's point of view in terms of financial policies and power pricing and from the broader perspective of the economic allocation of resources within the energy sector. We feel that there are a number of good arguments for employing a rate of return criterion in Hydro's case;

- We expect that in future Hydro will face increasing competition for funds in the capital markets. Hydro must therefore present to those markets the clearest and most favourable picture of its financial position. The use of rate of return in its financial planning would assist Hydro in this respect.

- Later in this report we will recommend a rate review process which will require Hydro to justify to the public its proposals for bulk power rate increases. In order that the validity of these proposals can be properly assessed, Hydro's financial performance must be compared with that of other utilities. Virtually all utilities use the rate of return concept.

- Provincial energy policy will require the Government to monitor the allocation of capital resources within the provincial energy sector. Rate of return appears to offer the only practical means of assessing Hydro's performance in this regard.

We therefore recommend that:

> *4.3 Hydro take the initiative with Government in undertaking a periodic review of Hydro's financial performance, using rate of return on net assets as a principal criterion.*

We feel that the rate of return should be one of the principal subjects dealt with in the Government-Hydro agreement recommended in Report Number One.

Use of Surplus Funds

We are aware that Hydro operations could result in surplus internally generated funds. Such an occurrence is unlikely in the face of continually rising costs, but there are two possibilities.

First, in the event that Hydro increased its productivity, hence reducing operating costs and increasing the operating surplus the rate of return achieved would be higher than that planned and it would be appropriate to use the surplus to reduce rates. Surplus funds could also arise through borrowing at a time when the cost of borrowing fell below the cost imputed to internally generated funds. In this case, it would not be appropriate to reduce rates since this would result in a lowering of what was considered to be an appropriate rate of return. A profit-making enterprise could declare a dividend. It has been suggested that the same end result could be achieved by Hydro's transferring the surplus to the Provincial Treasury in which case all citizens would benefit. Having regard for the traditional and political constraints under which Hydro operates we consider that this alternative is impractical. Furthermore, if one accepts the proposition that under certain circumstances surplus funds should be taken out of the system, it follows that, in the opposite circumstances funds should be put into the system. There has in fact been a suggestion that the British Government subsidize the C.E.G.B. to build up the return it has not achieved. This is not in accordance with the financial independence and responsibility we think is necessary for Ontario Hydro. For these reasons, and also since we foresee a continually growing need for capital, we feel that any surpluses should be retained within the Hydro system.

We therefore recommend that:

> ***4.4 Surplus funds be retained by Hydro to be used at its discretion for debt retirement, rate stabilization, system expansion and to provide for contingencies.***

Depreciation, Debt Retirement and Reserves

Having considered the broad question of financial policy within the context of rate of return and minimum financing costs, we now turn to a consideration of the two main components of cash flow, depreciation and debt retirement. As shown in Table 7, page 18, these elements supplied a quarter of Hydro's cash needs for capital purposes in 1971 and represented 86 percent of the total cash flow from internal sources including grants.

Charges to operations for depreciation purposes are consistent with "generally accepted accounting principles" as applied to any business enterprise. Since Hydro's practices in this area do not lead to the recovery of any more than original cost, there is no question here of inconsistency with the concept of

"power at cost". It should be appreciated, however, that Hydro's depreciation policies do have a significant impact on its needs for funds from external sources. To the extent that it accumulates funds through depreciation charges in advance of the need to replace the assets involved, these funds become available for financing system expansion. The "straight-line" method of depreciation recently adopted by Hydro will increase cash flows from operations so long as the rate of growth of system assets is maintained. This is desirable since Hydro's rate of return is increased and its dependence on external funds is reduced.

Under Section 76(c) of the Power Commission Act, Hydro is required to charge to operations an annual amount which together with interest at 4 percent per annum will retire debt over a 40-year period. Hydro interprets the Act as requiring that these sinking fund payments be shown on the financial statements as a cost of power. This is an unorthodox procedure which is not in accordance with generally accepted business practice, and which has led to a good deal of confusion over the years, since debt retirement is not normally considered a proper charge against operating revenue. Most business organizations, including utilities, do not treat debt retirement as a cost and do not set aside special reserves for it. Instead they use cash flow from depreciation and general surplus funds for this purpose.

The statutory requirement for debt retirement charges has been the basis of the criticism that Hydro practices "double depreciation", the implication of which is that an excessive proportion of Hydro's capital program has been financed from internally generated revenues and that, as a result, current rate levels have been higher than they otherwise would have been. We, on the other hand, have taken the position that internally generated funds have, if anything, been deficient, resulting in a less-than-adequate rate of return principally because of the slow accumulation of reserves under the sinking fund method of depreciation. We have studied this matter at length and are convinced that the practice, instituted by the founders of Hydro, of including in the billed cost of power a charge for debt retirement has been a prudent one, even though it would not be justified by normal business custom. It has enabled Hydro to build up an equity to stand behind its debt obligations, the cost of which has undoubtedly been significantly reduced as a result. The adoption of a rate of return policy is our recommended means of continuing to accumulate appropriate accretions to equity. Our concern in this regard is that the statutory requirement relating to debt retirement denies to Hydro the degree of flexibility we think desirable.

We therefore recommend that:

> ***4.5 Those sections of The Power Commission Act relating to the retirement of Hydro's debt be revised so that the only requirement is that debt be amortized over a period not in excess of 40 years.***

In view of the necessity in future for Hydro to generate increased internal funds and in keeping with the more flexible financial policies which we advocate, we suggest that the Hydro Corporation be given maximum discretion as to the amount of funds to be raised through rates and as to the manner in which these funds may be used. To this end we recommend that:

> ***4.6 The current charge to the cost of power for debt retirement be replaced by a charge sufficient to meet the requirements of the Corporation for internally generated funds for debt retirement and system expansion.***

The Smith Committee recommended that Hydro present its accounts in a more conventional form. A number of our recommendations including the adoption of "rate of return" support this concept. As a further move to standardize Hydro's financial statements we see a need to restructure the Equity account on the balance sheet to include the following components: Accumulated Equities, General Reserve and Contributed Capital.

In Report Number One, we recommend that an equity account be established to replace the "equities accumulated through debt retirement charges". This new account we have termed the "Accumulated Equities" account. We now propose the establishment of a General Reserve to replace the present Reserve for Stabilization of Rates and Contingencies, the size of which would be determined in accordance with the Corporation's assessment of future risks. The new component "Contributed Capital", would comprise the current balance sheet item "Contributions from the Province of Ontario as Assistance for Rural Construction".

The annual charge to the cost of power for debt retirement and system expansion should be credited to the Accumulated Equities account and the charge for stabilization of rates and contingencies should be credited to the General Reserve. Transfers from the General Reserve to the Accumulated Equities account should be made from time to time in order to regulate the size of the General Reserve in accordance with the Board's assessment of future risks. This in effect capitalizes any excess reserves. The charges so credited to the Accumulated Equities account will be allocated each year to the participating municipalities and the rural power district in the same manner as the debt retirement charges have been apportioned in the past.

We therefore recommend that:

> ***4.7 There be established on the balance sheet an "Accumulated Equities" account to replace the current "Equities Accumulated through Debt Retirement" charges and a "General Reserve" account to replace the "Reserve for Stabilization of Rates and Contingencies."***

There remains the cash management question which determines the proportion of the reserves which needs to be funded to achieve the desired level of liquidity. It is our view that this is a matter to be determined by Hydro in relation to fluctuating market conditions.

Accordingly, we recommend that:

> ***4.8 There be no requirement to fund any portion of the General Reserve.***

We return to this issue in our discussion of Rate Stabilization and Contingency Reserves in Section VI.

SECTION IV

HYDRO SECURITIES ISSUES

The Provincial Guarantee

The Smith Committee took the view that the Province should consider discontinuing its practice of guaranteeing Hydro's debt issues. The Committee's view was that the guarantee probably results in a somewhat higher interest rate on provincial bond issues and that even without the guarantee Hydro could reasonably be expected to "meet the competitive test of the capital market". It could also be argued that dropping the guarantee would contribute to the attainment of the financial independence we earlier listed among our financial objectives for Hydro.

While the guarantee does constitute legal recognition of the exceedingly close de facto relationship between Hydro and the Ontario Government, it is also a useful device for taking full advantage of that relationship for purposes of maximizing Hydro's credit standing and minimizing its interest costs. It is therefore questionable whether anything useful would be gained by either Hydro or the Province if the legal guarantee were removed as long as the basic *de facto* relationship remains unchanged. Even without a formal guarantee, the market would probably feel that the Province would still have to come through with assistance if Hydro found itself in financial difficulty. Furthermore, the slightly increased uncertainty over the status of Hydro bonds arising from removal of the legal guarantee, the need for higher margin requirements for purchases of such bonds, and the very important fact that they would not be eligible investments for some investors, are all factors which would contribute to increased interest costs for Hydro. The increase could be up to 50 basis points (one half percentage point in yield), and would almost certainly be as high as 25 basis points.

We therefore recommend that:

4.9 The provincial guarantee of Hydro's securities be retained.

Debt Marketing

Long-term and short-term borrowing

Hydro's policy has been to issue debentures with a maturity of 20 to 25 years although occasionally it has sold issues in the 5 to 10 year range. Since 1965, short-term notes have been issued with a ceiling of $250 million, but the value of these seldom exceeded that of Hydro's short-term investments. Hydro

also resorted to an "extendable" issue and a "retractable" issue in 1970. So it is apparent that Hydro has experimented with a fairly wide range of financial instruments. The essential question, then, is not the types of securities issued, but rather the extent to which Hydro uses them.

Since the market makes no significant distinction between Hydro borrowing and Ontario Government borrowing, it is necessary to consider the two together in discussing debt policy. There can be no doubt that in an environment of changing expectations relating to future rates of inflation, debt managers must be prepared to utilize both short- and long-term funds. In periods of credit stringency, Hydro should be prepared to use short-term funds even for long-term purposes. On the other hand, Hydro's emphasis on long-term debt is appropriate as a means of lengthening the maturity of outstanding debt during periods of credit ease. The matching of long-term assets with long-term debt becomes difficult in an environment where investors prefer short-term securities; however, there seems to be ample opportunity for Hydro to make increased use of short-term debt in periods of credit stringency. In fact Hydro has already begun this practice.

It is sometimes suggested that short-term borrowing should be left to the Ontario Government, since Hydro and the Province are regarded as one credit in the market. But this would deny Hydro the flexibility necessary to pursue a comprehensive policy of minimizing interest costs. Also it is possible that the Province might not need to go to the market at the time it was showing a preference for short-term securities. It would be difficult in those circumstances to justify Hydro's paying higher long-term rates simply because, by agreement, it was prevented from borrowing short-term funds.

As noted above Hydro utilizes short-term notes as a cushion against periods of short-term credit stringency. One might question the need for this program, particularly at those times when the funds are not required and are held in the form of short-term investments, the yield from which would, at best, be only marginally better than incurred interest and other costs. On the other hand the current practice gives Hydro added flexibility and protection in dealing in the ever-changing money markets.

For this reason we are generally supportive of Hydro's current policies regarding money market operation. Indeed, the current limit on Hydro's short-term note program, of $250 million, established by Order-in-Council, may be constraining should Hydro decide that it would be to its advantage to enter foreign money markets.

As we believe that Hydro would have little difficulty increasing its volume of commercial paper financing, it might improve its position in the market if it were to sell its notes to dealers as principals rather than having them act as agents. In addition consideration should be given to providing notes both in bearer and registered form.

Extending the market for Hydro bonds

There is a market among individual investors for 3 to 10-year debentures. One might have thought that general familiarity with the Hydro name would make Hydro bonds one of their preferred investments but the difficulty seems to lie in distribution. Investment dealers do not make contact directly with many individuals who might be interested in buying short-term bonds in small denominations, and banks have not yet become very active in the distribution of securities. There may be no easy solution to this problem but it would seem worthwhile for Hydro to explore more extensively with its underwriters and its bankers the possibility of developing the market for bonds in this range of maturities. Hydro could experiment with offering, say two maturities, partially open-ended as to amount, so as to obtain a better feel for potential markets. In addition to the apparent market among individual investors there is an important institutional market which few borrowers appear to be utilizing effectively. We therefore recommend that:

> ***4.10 Hydro put more emphasis on developing a market for debentures with maturities ranging from 3 to 10 years.***

Sinking fund provisions and operations

At present, Hydro issues do not have formal sinking funds. However, use of the debt retirement fund to buy outstanding issues, both in Canada and in New York, has substantially enhanced the marketability and, therefore, the attractiveness of Hydro debentures, particularly in Canada. It may be that Hydro could further enhance investor interest in a particular new issue by specifically establishing a sinking fund. Essentially, this would amount simply to a clear indication in the prospectus, which accompanies a foreign issue, of what Hydro is already doing in practice, in a way that will be obvious to prospective investors. Hydro issues in Canada do not require a prospectus.

The sinking fund, however, should not have to invest in particular Hydro issues, but rather should be available for the purchase of any issue that seems to be offered in volume in the trading market. This represents no departure from current Hydro practices. In our view Hydro should also be prepared to enter the secondary market, selling debentures out of its sinking fund, or trading individual issues, in response to definite bids from dealers, thus improving the position of Hydro bonds as a relatively liquid form of long-term investment. In other words, Hydro should not assume that the volume and mix of Hydro issues in investment dealer inventory will at all times be adequate to satisfy investor requirements.

Considering the foregoing, we recommend that:

> ***4.11 Hydro be prepared to sell or trade, as well as to buy its own outstanding issues as part of its debt management operations.***

Borrowing Abroad

When should Hydro borrow abroad? It should do so whenever the cost of funds is lower abroad than in Canada. But this rule is more complicated than it appears. In the cost of domestic funds must be included the potential increase in interest rates occasioned by borrowing a larger proportion of total requirements in Canadian markets. In the cost of foreign funds must be included an allowance for exchange rate risk and any other risks associated with borrowing abroad. The latter would include the sudden imposition of governmental controls on capital flows which could cause disruption in Hydro's capital financing plans. The increased possibility of restriction on Canadian borrowing in the U.S. market probably means that Hydro must be more cautious in its foreign borrowing in future than in the past.

Furthermore, the cost of both Canadian funds and foreign funds must be those interest costs Hydro would face after it had exercised all possible ingenuity in designing securities and in developing markets for them. It would be difficult to justify Hydro's borrowing abroad because of too high interest costs in Canada if these high rates were caused by a failure to offer appropriate securities and develop all potential markets in Canada. We have earlier suggested that this may to some extent have been the case in the past.

The emergence of Western Europe and Japan as capital exporting regions argues strongly that Hydro should reinforce its current efforts to develop investor interest for its securities issues in those markets. If the U.S. does not quickly solve its balance of payments problems, the need to develop alternative foreign markets for securities issues would be greatly enhanced.

Discussion with four New York underwriting firms makes it fairly clear that barring official interference, the Ontario Government faces no imminent limits on the funds it can borrow there. Its credit rating is very high and the market would almost certainly absorb issues well in excess of $100 million each. Its potential in other foreign markets is difficult to appraise since they have not yet been seriously developed, although a start has been made.

The Ontario Government has always borrowed for Hydro whenever Hydro felt obliged to obtain funds from the U.S. market. Hydro has placed issues in West Germany under its own name, as has the Ontario Government.

It would seem that Hydro would not encounter an increased interest cost if it borrowed under its own name, as long as the provincial guarantee was retained. The breadth of the market for Hydro issues might even be increased if it did so, since another name would be added to the list of eligible securities. Furthermore, there are some investors in the United States who appear to prefer issues that are related to tangible projects, and they might on balance actually prefer Hydro bonds to Ontario Government bonds. Finally, it might be desirable for Hydro to emphasize its status as a Crown Corporation by undertaking all its borrowing in its own name.

For all these reasons, Hydro should begin experimenting with placing issues in its own name in the U.S. market. It would probably be desirable to appoint a U.S. syndicate manager other than the one responsible for provincial issues in New York, so as to be in a position to compare performance.

Taking account of the above we recommend that:

> ***4.12 In addition to developing the Canadian market for its securities, Hydro continue to develop markets in the U.S. and other foreign countries.***

The Hydro Syndicate

Occasionally Hydro issues have not gone well. In such cases it is difficult to determine whether this was the result of advice from the syndicate manager, market judgment on the part of Hydro officials, the vagaries of the market or all three. On the other hand, if Hydro issues always sold quickly, one might again question the foregoing factors along with the possibility that the yield on the bonds had been too high. Objective criteria for measuring performance are difficult to establish, and matters of size, timing, maturity and price could all be criticized.

When a single issue fails to go well there is little cause for concern but there is much at stake in the long run. It therefore seems clear that Hydro should take a rather more specific interest in the performance of the individual members of the Hydro syndicate. (At present, syndicate membership is decided in conjunction with the Province). The effectiveness of individual investment dealers can change rather quickly, and the prevalence of mergers among dealers in recent years attests to the swiftness of change in the industry. It is a question as to whether such changes in effectiveness are sufficiently quickly reflected in the participations of individual dealers in Hydro issues.

In order to promote the effective operation of its syndicate Hydro should ensure that the participation of an individual member is related to his performance. More detailed records and continuous analysis of bond dealers' performance is needed. To date, detailed records have been difficult to obtain because of the dealers' real concern that such disclosures would rebound to their competitors' advantage. Notwithstanding such concerns, Hydro should make every effort to obtain information from members of its syndicate relating to such matters as:

- the distribution of Hydro issues in the past,
- their trading volume in Hydro issues, particularly during the period immediately following a new issue.
- their trading volume in debt issues in general,

- the size of their capital, and
- the size of their sales force devoted to distributing debt issues.

The possibility that participations might be determined in part by extraneous influences would be diminished if a set of objective criteria for judging performance were defined and applied. We therefore recommend that:

> ***4.13 Hydro develop a system for continuous appraisal of the performance of its financial syndicates including the managers.***

It is accepted that the financial houses do not normally make available to clients data which would reveal details of their operations. But we would argue that because of its size and importance in the market an exception in Hydro's case would be justifiable.

Conversely, members of the Hydro syndicate might well benefit from having more information about Hydro's expected requirements. At present the market fears the worst about future Hydro requirements since it has little information to go on. On the other hand, Hydro fears, and with some justification that large holders of Hydro bonds could affect the market before an issue with too much advance information. Everything considered we feel that Hydro should make public a projection of its capital needs for the current year plus one. This seems reasonable since Hydro now makes these data available to the U.S. money market.

The force of some of the foregoing recommendations is that Hydro should take an even more detailed interest in the marketing and trading of its debt issues than it has been accustomed to do. If it is to operate its sinking fund in a more flexible manner, then it must have the necessary market expertise for doing so. If it is to keep on top of developments in the market for its issues—among various types of institutions and different groups of individuals—then it must be organized to analyze such developments at frequent intervals.

For these reasons it may be desirable to re-allocate staff to form a small group within Hydro's Treasury Division that would concern itself primarily with these matters.

SECTION V

FINANCING BY THE MUNICIPAL UTILITIES

The municipal electric utilities appear to have followed very conservative financial policies, in that some 90 percent of their capital programs have been financed directly from revenues, as compared to about 26 percent in the case of Ontario Hydro. As shown in Table 14, substantial surpluses have been accumulated in the process. The rate of growth of (gross) assets in the municipal utilities has averaged somewhat less than Hydro's over the last decade and this on average allows a greater measure of internal financing. It is, however, evident on the basis of our proposal for an optimal financial policy, that lower annual financing costs, and hence lower retail rates, could have been achieved in many of the systems that have experienced continuous rapid rates of growth had such growth been financed to a greater extent by debentures.

There is a useful rule of thumb that can be applied to utility financing which states that if capital requirements are growing at a more rapid rate than the carrying charges (principal plus interest) on debentures then the lowest annual financing charges will result from a policy of debt financing rather than reliance on internally generated funds. The application of this rule must be accompanied by a review of such considerations as the variation in annual growth rates and interest costs compared to the expected long-term trend. A study recently carried out by Hydro, at the request of the Ontario Municipal Electrical Association (O.M.E.A.) illustrates this principle. It showed that a decision to move, within specified time periods, to a position within which all new plant is financed from internal funds would result in much higher financing costs, hence higher overall power costs.

We have reviewed the rates of return, over the period 1962 to 1971, of a random sample of municipal utilities and have found that, for some utilities, rates of return have ranged as high as 15 percent with ten-year averages exceeding 10 percent. On the same hand, other utilities experienced returns on net assets which were extremely low, and at times actually negative. It is important to note that the utilities referred to are neither especially small nor slow growing. These variations suggest that a wide range of financial policies have been applied by the municipal utilities. In cases where the rate of return is too high one may question whether an undue reliance on internally generated funds has resulted in rates higher than they might otherwise have been. Extremely low rates of return suggest, on the other hand, that rates may have been too low.

The variety of financing policies among the various municipalities may then be contributing to undesirable retail rate differentials. This is explained in greater detail in Section VIII.

TABLE 14

COMPARISON OF CAPITAL AND RESERVES TO TOTAL CAPITAL, RESERVES AND NET DEBT, ONTARIO HYDRO AND MUNICIPAL UTILITIES, DECEMBER 31, 1971

($ Millions)

Ontario Hydro		
Net debt—		
Long-term liabilities	$3,418	
Notes payable	217	
Current liabilities	219	
Less—current assets	(398)	
—investments held for debt retirement	(52)	$3,404
Capital and reserve—		
Contributed capital (debt retirement and provincial grants)	946	
Reserve for stabilization of rates and contingencies	253	1,199
Total		$4,603
Capital and reserve as percent of total		26
Municipal Utilities		
Net debt—		
Debentures outstanding	$ 122	
Accounts payable and other liabilities	75	
Less—current assets	(90)	
—inventories	(19)	
—sinking fund on debentures	(18)	70
Capital and accumulated net income		610
Total		680
Capital and accumulated net income as percent of total		90

In support of the mandate of power at lowest feasible cost we recommend that:

> ***4.14 Hydro and the municipal electric utilities together adopt a financial policy that seeks to minimize retail rates over the long term, through appropriate emphasis on debt financing and using rate of return as a principal criterion.***

As a result of a broadening of the terms of the enabling legislation in June, 1970, municipalities of less than 20,000 population are now able to sell debentures for electric utility financing to the Ontario Municipal Improvements Corporation at rates not much in excess of the Province's own borrowing rate. Since that date eleven municipalities have sold to O.M.I.C. debentures for hydro purposes in the total amount of $850,000.

Larger municipalities have the knowledge and expertise to issue debentures in the public market. Issuance of such debentures does not appear to present a financing problem of any significant magnitude. Nor from a municipal point of view does the issuance of debentures for utility purposes pose problems as far as Ontario Municipal Board approvals are concerned. The OMB treats the debt as self-sustaining through user charges rather than as an additional burden on the property tax base. We therefore feel that although some municipalities would be required to increase the extent of their debt financing, this should not present serious problems for either large or small municipalities.

The reason most frequently given by utility Commissioners for the high degree of reliance on internally generated funds is that municipal councils have objected to increased debt financing. However, our own poll of municipal councillors which is admittedly limited, has revealed that the majority tend to accept the advice of the utility Commissions on financing and rate matters. Our studies have also revealed a clear allegiance on the part of many municipal utilities to what might be termed a "debt-free ethic". In our view, and in support of the principle of local autonomy, it is the responsibility of the Commissioners to promote a financial policy which leads to minimum Hydro rates and at the same time is in the best interest of the municipality as a whole.

In defining appropriate financial objectives for Hydro we pointed to a need for financial independence for the Corporation and an arm's-length relationship with government. In order to preserve the integrity of the delivery system as a whole, especially in matters of financial policy and rates, it is essential that the same sort of relationship exist between local government and distribution utilities.

SECTION VI

PRINCIPLES OF POWER COSTING

Power Costing and Bulk Power Rates

Ontario Hydro is responsible for virtually all electricity supplied at the wholesale level in Ontario. Its customers consist of 353 municipal utilities, 9 interconnected systems including private utilities and the power district which includes some 645,000 retail customers mainly in rural areas of the Province and 91 large directly served industrial customers. Power costing is the term used by Hydro to describe the allocation of costs of generating and transmitting electrical energy among these customer groups. Its importance derives from the fact that power purchased from Ontario Hydro represents an average of 75 percent of the municipal utilities' total costs, 56 percent of the costs to the retail customers in the rural power district (the difference arises from the high distribution costs incurred in serving in the low density areas) and 100 percent of the costs to the direct industrial customers.

Power costing has become a controversial topic. In periods of stable or declining rates, such as Ontario has enjoyed for several decades, the public has paid little attention to the principles of cost allocation. But now the picture has changed and Hydro predicts an annual average increase in excess of 8 percent in bulk power costs over the period 1972-77, which figure includes an allowance for inflation.

As a direct result of its "power-at-cost" philosophy there has always been in Hydro a strong identification with the theorem that rates charged to primary or bulk customers should be tied closely to cost allocation procedures. This has been true with respect to the municipal utilities whose power rate has always been their respective allocation of total bulk power costs. However, rates to Hydro's direct industrial customers, the smallest of which, in terms of power demand, is larger than three quarters of the municipal utilities, do not necessarily reflect precisely the amount which would be allocated on a cost of service basis. Bulk power costs are allocated to the power district in the same manner as to the municipalities, but the process of recovering these costs from retail and direct customers within the power district is different. For example, the direct industrials pay 3.25 mills/kWh for all energy taken versus 3.0 mills/kWh for the municipal utilities.

In the case of retail rates, while revenues in total cover total costs, considerations of rate simplicity, practicality, social requirements and competitive necessity intervene to further loosen the links between rate structures and cost responsibility. This is true not only in Hydro but also in other utilities such as Britain's C.E.G.B. which are even more committed than Hydro to the recognition of real cost differentials in their bulk supply and retail power charges.

Save for some concern over how Hydro has, in fact, made the allocation of bulk power costs to its primary customers, this historic tie to costs has, in the main, been proper. Rates must reflect costs if they are to provide potential buyers with the proper signals of the underlying advantages and disadvantages of electrical energy relative to other energy sources.

In coming years, prices of electricity will probably be required to reflect government priorities in the fields of energy and environmental policy, forcing the rate objective to diverge from that of cost recovery as narrowly defined. Hydro may also be subject to government regulation aimed at achieving objectives external to Hydro and the energy sector generally. These matters have been addressed in some detail in Report Number One. We reiterate, however, the warning that any departure from the principle of cost-based power rates, for reasons of energy, environmental, regional development or other government policy must be carefully justified and closely tracked. Burdens imposed on the Hydro system which are not required of other public or private enterprises should be met by government subsidy and not incorporated in power rates.

Demand and Energy Charges

Of the many possible forms of electrical rates, Ontario Hydro uses a system that is based on the fact that the cost of supplying electric power falls naturally into *two* major categories: demand or capacity charges which are related to the level of maximum consumption of electricity measured in kilowatts, and energy charges which are proportional to energy consumption (use of capacity over time), in kilowatt hours. Charges to bulk power customers are thus assigned both on the basis of established peak demand and energy actually consumed. The problem is to determine how total costs should be allocated to these two categories. Customers with high load factors prefer a combination of a relatively low energy rate and a relatively high demand rate, while those with low load factors prefer a relatively high energy rate and a relatively low demand rate. Unfortunately, there is no ideal way to split demand and energy costs and any method tends to be somewhat arbitrary, especially in the long run.

Prior to 1966, when the current costing system was introduced, the split was almost entirely arbitrary. With the implementation of the new system an approach was adopted which, in effect, standardized the energy rate, leaving only the demand cost variable. This move was justified on the grounds that it was desirable to be able to estimate the wholesale energy cost in advance. At that time the energy rate was established at 2.75 mills per kWh, which rate it was felt could remain in effect for approximately five years.

From the standpoint of optimum resource allocation, it would be desirable to vary the bulk system charges for demand and energy continuously in accordance with the short-run marginal, or incremental, cost of providing

them, but the costing system can hardly be that flexible. The relationship of demand to energy costs varies continuously over time, and a fixed energy rate can result in a significant misallocation of costs among several classes of customers. Hydro appears to have recognized this in its recent decision to increase the energy component of the bulk power rate in 1973 by one-quarter mill/kWh to all bulk power customers.

Continual review is necessary to ensure that the components of the bulk power rate are properly related to costs. If, for example, Hydro's energy rate to the municipal utilities is significantly lower than its cost of energy production (in the short run mainly fuel, variable maintenance, water rentals and losses in transmission and transformation), the utilities could be influenced to encourage energy consumption unduly. The effect of these faulty price signals would be that losses on sales of energy would be made up in the demand charge with the result that customers with high load factors would be subsidized by those with low load factors.

One alternative to the present system of fixing the energy portion of the wholesale rate would be to distribute costs on the basis either of load or energy only. The inevitable result of such an extreme solution would be to ensure the misallocation of resources within the Hydro system. For example, if all costs were distributed on the basis of energy, there would be no inducement to control demand with the result that the growth in requirement for generating facilities would continue unchecked.

We believe that a more desirable alternative would be to attempt a closer approximation of marginal-cost pricing for both elements of the bulk power rate. It is our belief that marginal costs provide a better test of the level of electricity prices than the fully distributed or average costs currently employed. Recent studies by Hydro have revealed that short-run marginal generating costs are as shown in Table 15.

TABLE 15

SHORT-RUN MARGINAL GENERATION COSTS FOR ONTARIO HYDRO

Type of Generation	Marginal Cost (mills/kWh)	% of Capacity
Base load hydraulic and nuclear	up to 2.0	55
Reheat steam thermal units	3.25-4.75	38
Non-reheat thermal units	4.50-6.50	5
Emergency supplies (combustion turbines, purchases)	up to 30.0	2

In practice, the normal range of marginal generating costs is not nearly as wide as this tabulation suggests. Hydro studies show that short-run marginal generating costs average only about 1 mill/kWh lower for summer months, taken as a whole, than for winter months, with a measurable differential between daytime and nighttime periods only on weekdays. As would be expected, the variance about the mean value is much greater in winter months than in the summer. In 1971 an energy charge of between 4 and 5 mills/kWh would cover most periods with somewhat higher costs on cold winter weekdays.

With approximately 4 million kilowatts of fossil-fired generation now on the system and a further 6 million committed, retention of an energy charge in the 3 mill/kWh range is clearly inappropriate. But in revising this figure one must bear in mind that Hydro has also committed substantial blocks of nuclear generation, which by 1990 may be providing 60 to 70 percent of the system energy requirements at a cost in the 1 mill/kWh range. Clearly one must continually monitor the changing marginal costs of generating electrical power to ensure that these changes are reflected in the prices charged.

To this end we recommend that:

> ***4.15 Both demand and energy components of the bulk power rate be reviewed annually and be adjusted as circumstances warrant.***

Power District Diversity

Diversity is the measure of the ability of different loads to make use of the same plant. It is measured in kilowatts, as the difference between the peak coincident demand of two or more individual customers and the sum of their individual noncoincident peak demands. If, for instance, the individual peaks were coincident, then the diversity would be zero. However, in practice, all customers' maximum demands will not occur at one time. It is fair therefore that diversity be recognized in the rates charged.

A municipality is billed on the basis of the maximum simultaneous demand measured at the individual points from which it is supplied from Hydro's high voltage grid stations—the diversified or "totalized" demand. This diversity arises from the diversity which exists among the various classes of customers to which the municipality retails power.

To assist in bringing the benefits of diversification to customers in rural areas and to the direct industrial customers, a power district was created in 1965 which encompassed all primary loads in the Province not served by the municipal utilities. For costing purposes the power district is treated exactly as if it were the 354th municipal utility and the demand charges it attracts are a function of the average of the twelve monthly coincident peaks of its customers. These charges are then prorated to the rural retail and direct industrial classes according to their respective group peak loads. A special charge is assigned to retail customers to cover the costs of the rural distri-

bution system. It is clear from Figure 1 that real benefits accrued after 1965 to the rural retail customers, and to a lesser extent to the direct industrials, from the decision to create the power district for costing purposes.

The concept of the power district has been attacked on the basis that the geographic area covered by it is much larger than that of a typical municipal utility and so, therefore, are the diversity benefits enjoyed by those customers within it. (The costing load of direct and retail customers as a group is approximately 14 percent less than the noncoincident sum of the monthly peak loads of the individual direct and retail supply points.) Also some municipal utilities have argued that a small amount of diversity does exist among them and that, in justice, this should be recognized. Hydro has estimated that an adjustment for diversity would only amount to a net saving to the municipal utilities of about 1 percent. This matter was, however, last studied in depth in 1965 and should be reviewed. Probably the key reason why Hydro has not made this adjustment is that the power district does suffer from the necessity of serving the residue of customers remaining after the municipalities, through annexation, have absorbed the most favourable, highest density,

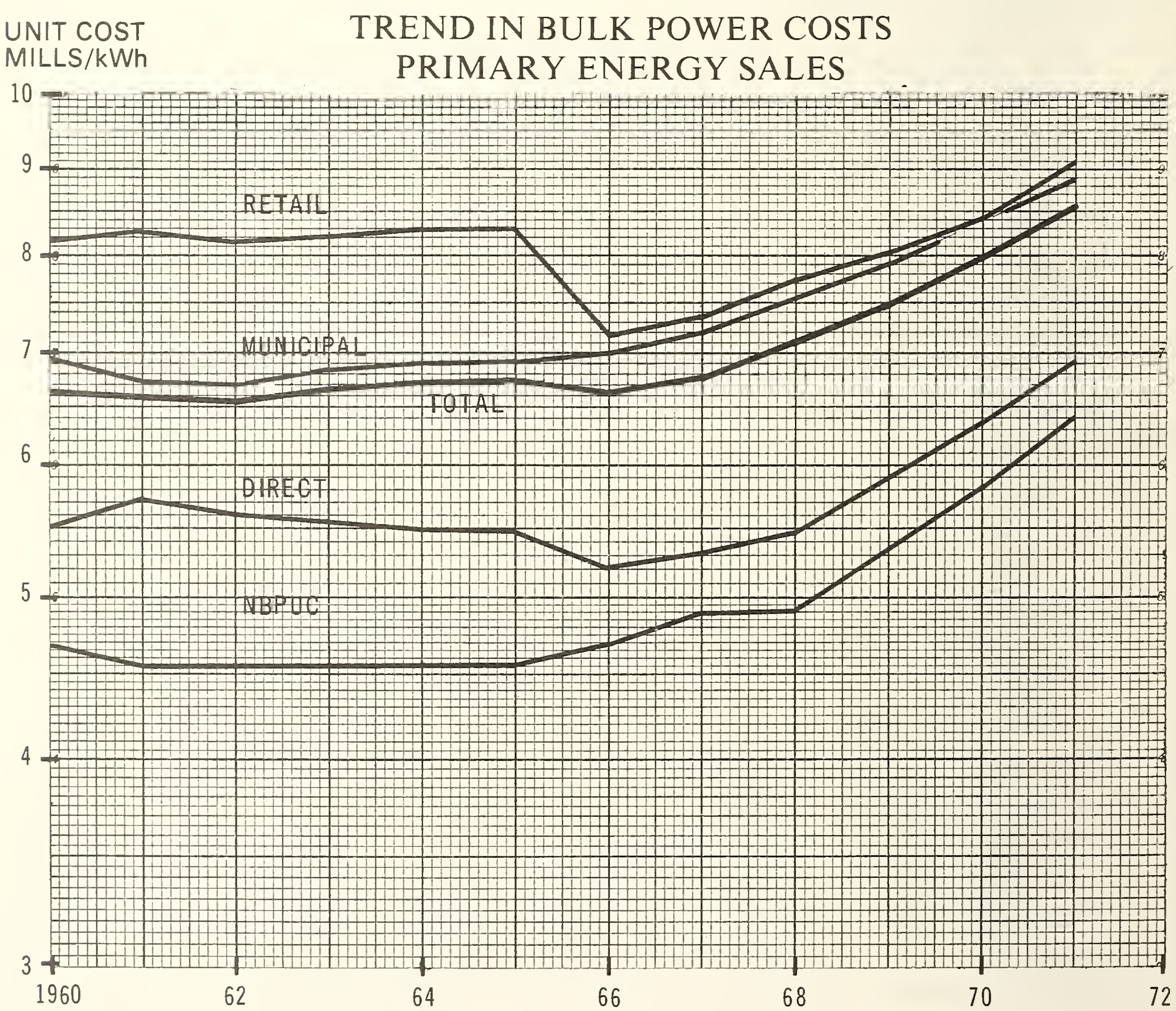


FIGURE 1

loads. Given this, it could be argued that it would not be fair to deny power district customers their present diversity advantage.

Some large industrial customers in the power district do not accept that its creation has been of benefit to them. It can, however, be demonstrated that for these customers the savings involved in being charged on the basis of a highly diversified kilowatt are substantial. The direct industrials as a group have a relatively high monthly load factor—some 80 percent compared to 70 percent for the municipal utilities and even less for the rural retail customers. As a result their coincidence factor, i.e., the likelihood that an individual industrial load will cross the peak of the direct industrial group, is also high relative to other customer groups. Under the present costing system the direct industrials enjoy both the diversity existing among themselves as individual customers, and between themselves as a group and the retail customers of the power district. If they were costed separately, as the 355th "municipality", they would experience an increase in their cost of power due to loss in diversity. These diversity benefits are the principal reason why Hydro's direct industrial rates, demand and energy charges taken together at any load factor, are lower than its bulk power rate to the municipalities.

Indeed, according to Hydro's own rate philosophy, the direct industrials, especially those with high load factors, are currently paying less for electricity than they should be. The concept is that at a 100 percent load factor, where there is no possibility of diversity, the rate to the directly served industries would equal the bulk power charge to a municipal utility served at the same voltage and from one supply point only. As shown in the tabulation below, and *given the 1971 level of demand charges* to direct industrial customers and municipal utilities, the energy rate to the former would have to be over $\frac{3}{4}$ mill/kWh higher than to the latter to achieve this. In 1971, the differential was only $\frac{1}{4}$ mill, and this is still the case.

		Annual Charge
Direct industrials (115kv. frequency assessed)		
demand:	\$2.37/kW/mo × 12	\$28.44
energy:	8760 hrs. × \$0.003	26.28
		\$54.72
Municipal electric utilities		
common costs:	\$2.945/kW/mo × 12	\$35.35
energy:	8760 hrs. × \$0.00275	24.09
		\$59.44

Difference

difference \$59.44 − 54.72	= \$4.72
or \$4.72 ÷ 8760 hrs.	= \$0.0054/kWh
plus existing energy differential	= \$0.0025/kWh
differential needed to equalize rates	= \$0.0079 or >$\frac{3}{4}$ mill/kWh

There are a number of alternatives for dealing with the question of power district diversity:

- Municipal diversity could be measured and allowed for in the costing process though, as stated earlier, the cost saving would be minimal.
- Diversity allowances could be eliminated with individual direct customers and rural areas treated as separate entities for cost allocation purposes. To be fair, however, it would be necessary to consider metering each municipal delivery point separately and this, in turn, would lead to problems in determining what constitutes a "delivery point" for cost allocation purposes. This would not seem, at present, to be an attractive alternative, but could possibly become so, in future, as and when our proposal that the municipal utilities be merged into substantially fewer and larger units is implemented. Its feasibility should, therefore, be re-examined.
- The power district could be carved up into smaller geographical areas. Again the move to regional utilities, each incorporating sizeable portions of the power district within its expanded borders, would lead in this direction. The problem of serious rate disparities, arising from the loss of diversity and markedly different costs of distribution in the remaining pieces of the power district would then have to be faced.

We therefore strongly urge that careful study be made of the effects on the power district of the rationalization of the retail system proposed in our Report Number One.

The Common Cost Philosophy

The allocation of the bulk power costs by Hydro begins with the determination of three quantities:

- The total cost of providing electricity over the year.
- The total amount of primary energy delivered in kilowatt-hours.
- The sum of the individual customer's average monthly peak demands in kilowatts (frequently referred to as their "costing loads").

The total primary energy demand measured in kWh is multiplied by the energy component of the bulk power rate (currently 3.0 mills/kWh) to determine the proportion of total cost to be recovered through the energy charge. This amount, comprising some 35 percent of total bulk power costs,

is then subtracted from the total cost to arrive at the total demand component of cost.

The next step is the subdivision of this total demand charge into 12 categories or functions. Seven of these are classed as common costs, being shared by municipal and power district customers, following Hydro's common cost philosophy, on the basis of their costing loads. The remaining 5 elements of the demand component are non-common, representing charges by Hydro to certain customers for facilities that other customers provide for themselves.

The common functions are described in detail as follows:

- *Power Supply.* By far the largest cost function, this covers the total cost of generating or purchasing power less the cost allocated on an energy basis. Thus it reflects primarily fixed charges such as depreciation, interest on capital, and operating and maintenance staff costs.
- *Grid Facilities.* This comprises the cost of power grid transmission and transformation facilities, and communications facilities. It includes the cost of step-up transformation at the generating stations, interconnecting lines between sources of power, mainly at 230 kv but including some at 115 kv where these lines form part of the grid, and step-down transformation at the terminal stations.
- *Radial Transmission.* Comprises the cost of transmission and distribution lines emanating from the grid and carrying power to the customer's points of delivery.
- *Cost of Return on Equity.* A charge, included in the demand component of the cost of power, sufficient to provide each municipal utility and the power district a four percent per annum return on the accumulated equity of each municipal utility and the power district, as shown on the books of Ontario Hydro.
- *Administration.* Activities under this function involve expenses in the executive, general management, engineering, finance, marketing, personnel and service areas of Ontario Hydro.
- *Debt Retirement.* Hydro raises large amounts of capital by bond issues. As explained in Section III interest and principal is charged to the cost of power.
- *Reserve for Stabilization of Rates and Contingencies.* This item will be discussed later in this section.

The *pro rata* distribution of common costs provides a solution to the otherwise extremely complex problem of attempting to assign actual costs for use of specific generating and grid facilities to individual users. Problems

of matching the demands of specific customers to the characteristics of the nearest generating plant are also avoided. For example, it is unlikely that a high load factor industry would be prepared to pay the actual costs of supply from the nearest power source if it were an obsolete high cost thermal plant, normally used for peaking purposes only.

The experience of large public and private power utilities in other jurisdictions confirms the desirability of distributing demand costs on the basis of individual peak demands without attempting to relate these closely to the distance of the load from the point of generation. The one principal exception is the Bonneville Power Administration which retains rate discounts for some industrial contracts based on the proximity of the customer to the Columbia River dams from which it obtains power. This practice arose because BPA was formed as a marketing agency only and we were advised that they intend to phase out the "proximity rebate" as current contracts expire.

Hydro has not always followed its current policy of uniform geographic bulk power cost pooling. Prior to 1943 a complicated system referred to as "costing by wire" attempted to allocate the cost of particular components of the power system to individual customers. In that year generation costs for the Southern Ontario system were pooled; in 1953 230-kv transmission costs were pooled, and in 1956 pooling was extended to include the 115-kv system. These moves led to a revision of the power costing system in 1965 and to the present system whereby wholesale rates for bulk power at sub-transmission voltage and at a given load factor are approximately uniform across the Province.

The logic of a system of rate differentials based on distance from generating stations loses force when applied to a large interconnected grid system such as that now operated by Ontario Hydro. As each new generating station is added the location of large industrial customers with respect to the most economical generation facility changes and the complexity of "costing by wire" increases accordingly. Furthermore, in any grid system it is impossible to identify the origin of the supply to a particular customer, or the cost of the particular supply. We recognize that some industrial customers whose location decisions were made before full cost pooling was introduced feel that they have been discriminated against, but we maintain that it is no longer practical or equitable to set rates to these customers on an individual basis or to "dedicate" to their use blocks of power from specific generating plants.

It has been suggested that the logic of cost pooling would not necessarily apply to the vestigal 25-cycle system which still serves 15 or 16 large industrial customers in and around Niagara Falls and in Northeastern Ontario. Total peak demand of these customers is approximately three percent of the total system and is declining, in relative terms, each year. A separate 25-cycle costing pool has been a long-standing demand of the Niagara Basic

Power Users Committee. Although it would prove a difficult task involving many complex judgments, the generating and transmission facilities serving these customers could be identified and a separate 25-cycle pool established. Allowance would have to be made, for example, for the value of reserve generating capacity provided by the 60-cycle system and agreement reached on an entitlement formula for the assignment of Niagara River flows to the 25-cycle and 60-cycle systems operated by Hydro. Even if these problems could be resolved it is by no means clear that the 25-cycle users would benefit, since as a separate costing unit they would lose the very considerable diversity benefits they now enjoy by virtue of their inclusion in the power district.

In any event as a point of principle Task Force Hydro recommends against the establishment of a separate 25-cycle costing pool on the grounds that it would discriminate against the remainder of the direct industrial customers, some of whom have also been located for decades close to points of generation. We recognize the very real difficulties being experienced by the member firms of the NBPUC, partly as a result of rising power rates. We would, however, propose that any assistance offered them be provided directly by government and be limited to specific purposes which would not compromise the provincial commitment to cost pooling on the bulk power system.

Non-common elements in the cost of power contribute to variations in its wholesale price. In general, they represent facilities provided by Hydro for certain customers which other customers provide for themselves. As detailed below there are five non-common functions: two stages of transformation, metering costs, specific facilities and frequency standardization.

- *Transformation Stage I.* Compromises the cost of step-down transformation from either 230 kv or 115 kv to voltages greater than 10 kv.

- *Transformation Stage II.* Comprises the cost of transforming voltages resulting from Stage I transformation down to voltages less than 10 kv.

- *Metering.* This function includes the cost of metering where utilities do not require Stage II transformation.

- *Specific Facilities.* This function recovers such costs as interest, depreciation and maintenance associated with lines owned by Ontario Hydro but located within the boundaries of the municipality and used exclusively by that municipality.

- *Frequency Standardization.* The frequency standardization assessment covers the cost of amortizing the debt incurred in converting 25-cycle appliances and facilities in Ontario to 60 cycle. This cost will be fully amortized by early 1974.

Return on equity, discussed at length in the subsection following, might also be considered as a non-common element in the cost of power although it appears as a credit rather than a charge. It is deducted from the sum of the common and non-common functions in arriving at the total cost of power.

Variations in bulk power costs are reflected in varying degrees in retail rate levels which will be dealt with in the rate philosophy section of this report. These variations are, however, minor in comparison to the differences in local distribution costs.

On the basis of our review we have come to the following conclusions on the subject of cost pooling:

- essentially uniform geographic bulk power rates are well suited to the nature of Hydro's system and inherently equitable to the majority of customers.
- as upper tier regional utilities are formed, as recommended in our Report Number One, a clear point of interface will be established between the bulk power and distribution systems. At present, charges by Hydro to the municipal utilities for "specific facilities" are too low to provide an incentive for the utilities to assume ownership of these facilities. Such anomalies will gradually disappear as the move to a common interface point is made.

Equity

When Ontario Hydro came into being some 67 years ago the decision was made to finance from borrowed capital rather than through the issuance of capital stock, although later substantial contributions were made by the Province to assist with rural electrification. A scheme was established whereby debt repayments would be guaranteed by the Province and a sinking fund charge for debt retirement was levied against the municipal customers of the system and included in the cost of power. In accordance with the terms of their contracts with Ontario Hydro, the contributing municipalities agreed to share the sinking fund charges pro rata.

It was soon recognized that this procedure did not readily facilitate the entry of new customers—municipalities wishing to make use of assets which had been partially paid for by the existing customers. Further, as time went on new equipment was purchased at prices different from those paid for the original assets being replaced.

These problems were dealt with by providing that the sinking fund charges would be shared by all customers, but that for each dollar of original assets the customers would pay the sinking fund charge only once. And further, at the end of the required term (for most of Hydro's history, forty years) the payments would cease and a credit equal to the contribution made forty

years earlier plus interest would be allowed. The first sinking fund credits were allowed in 1951.

Originally, when the costs of system facilities were allocated to customers in proportion to their use thereof, the concept emerged that the municipalities were acquiring equity in the specific assets used to serve them. As the system increased in complexity, it became impossible to specify which assets served which customers, and recent statements of the O.M.E.A. have suggested that debt retirement charges were always intended to provide for the retirement of debt and the creation of equity in an ongoing enterprise rather than to achieve debt-free ownership of specific assets.

By 1965 the implementation of the scheme had become so complicated that Hydro asked the municipalities to choose between two simplifying procedures, both of which were based on continuing to credit to each municipality a share in the equity in the system equal to the total of its contributions to the sinking fund for debt retirement. One procedure would have dropped altogether the concept of "sinking fund relief", while the other maintained it as a return on equity which would operate as follows:

- Debt retirement charges sufficient to retire debt in forty years would be levied as a cost of power.
- Equity would accrue to the municipal utilities and the power district in an amount equal to their respective contributions to the sinking fund charges.
- Each of these customer groups would receive annually a return on equity equal to four percent of its accumulated equity at the previous year end. Benefits would begin at once without a forty-year wait.
- Each municipal utility, including the power district, would pay a "cost of return" proportional to its demand; i.e., on the unit demand charge, equal to the total return allowed to all customer groups divided by the total costing load.

Although there was substantial support in Ontario Hydro for the first alternative, the O.M.E.A. members chose the second.

By the end of 1971 the municipalities' "equity" in Ontario Hydro, accumulated through their payments for debt retirement, amounted to just over $577 million. Retail and direct customers were credited with $242 million.

The equity issue is not, in essence, a problem of power costing since charges (costs of return) and returns cancel out for all customer groups. The major impact of the equity exchange is to contribute to variations in the cost of power to, and ultimately in the retail rates of, the various supply authorities. For example, in 1971 St. Mary's enjoyed an 8.3 percent decrease in its bulk

power bill because of the equity process whereas Nepean Hydro, which serves a fast growing Ottawa suburb, suffered from a 2.4 percent increase. Of the 353 municipal utilities, 224 benefitted and 129 lost on the equity exchange (Table 16). The total net gain of $181,600 was made up by retail and direct customers of the power district through their losses on the exchange.

TABLE 16

COST OF AND RETURN ON EQUITY FOR MUNICIPALITIES—1970

	Municipalities			Total for Region	
Region	**Gains**	**Losses**	**Total**	**Net Gain**	**Net Loss**
Western	77	7	84	$ 583,647	
Niagara	49	12	61	262,833	
Central	7	26	33		$ 102,515
Eastern	37	41	78		640,522
Georgian Bay	47	22	69		15,780
Northeastern	3	15	18		104,277
Northwestern	4	6	10	198,168	
Total	224	129	353	$1,044,648	$ 863,094
Power district					181,554
					$1,044,648

As discussed earlier Hydro has adopted a cost pooling concept whereby a customer pays a *pro rata* share of total system costs rather than the cost of the specific facilities used to supply him with power. The return on equity procedure creates variations in costs which are inconsistent with this pooling philosophy.

Equity exerts a negative cost influence on growth since the impact of cost of return is immediate with the connection of new load while the counter impact of the increase in return is delayed until the equity base builds up.

Retail customers, particularly large industrial customers, see differences in rates between those charged by municipal utilities and Ontario Hydro's rates to large direct users. These differences may or may not be influenced by the return on equity, but in any event the retail customers will attempt to obtain service from the lowest rate source, and where movement does occur, it disrupts existing equity/load ratios. Similar problems are caused by annexation of portions of the power district, or by municipalities who wish to be reabsorbed into the power district.

Perhaps the most fundamental argument against this practice is put forward on behalf of the customer who, having contributed to equity formation in

one municipality for years, moves to a new community and loses the benefits of these contributions. Given the mobility of people today, it would seem preferable to have the benefits apply uniformly to all customers, regardless of where they choose to live in the Province.

In rejecting the Hydro proposal which would have resulted in a more complete pooling of costs and therefore a reduction in rate disparities, the O.M.E.A. chose to favour the "pioneer" municipalities rather than to support greater rate uniformity. It argued that the equity exchange puts at least part of the burden of raising new capital on those municipalities whose rapid growth makes system expansion necessary.

On the other hand, in briefs to Task Force Hydro some municipalities, invariably those losing out on the equity exchange, argue strongly against retention of the system. As one brief put it, "We believe the cost of any commodity today should not be dependent upon the amount purchased in the past."

At the 1972 O.M.E.A. annual meeting the Chairman of North York Hydro said that the return on equity transfer payments were costing his utility $750,000 a year, thus making the "Hydro Club the most expensive in the world."

For the most part, operation of the return on equity scheme does not directly affect Hydro, since it operates merely as a bookkeeper, paying a return on equity to customers of the system and collecting an equal amount in total through additions to the cost of power. However, being interested in rate uniformity, Hydro should favour abandonment of this scheme. Indeed retail rate disparities arising from the equity exchange constitute a continuing public relations problem.

In Report Number One we recognized the importance of equity in defining the interest which the municipalities have, from the beginning, been intended to hold in Ontario Hydro. As we indicated it appears that "the Municipal Corporations were intended to be participants in the System . . . with legal title to the assets of the system being registered in Ontario Hydro". We therefore put forward our Recommendation 1.31 which in effect guarantees the continuance of the concept of equity—by recognizing the claim on the assets of the Corporation by the participating municipalities and the power district. Despite this we find return on equity to be at odds with the principle of cost pooling. We therefore recommend that:

> ***4.16 The practice of paying a return on accumulated "equities" of the municipal utilities and the power district be discontinued.***

In a four year phase-out, the most seriously affected municipality would suffer an annual increase in its bulk power cost of $1.40 per kW over the period or less than 3 percent per year.

The "13th Bill"

Historically, the municipal utilities have been billed monthly on an interim basis, with an adjusting 13th bill issued each year in March after actual costs for the year have been determined. This arrangement is a contractual obligation, enshrined in the supply contracts between Hydro and the distribution utilities. This is regarded by the O.M.E.A. as a manifestation of the role of the utilities as the owners of Hydro and as guarantors of its financial stability. Customers of the power district, on the other hand, are billed at pre-determined rates, with any deficit or surplus being carried in a special section of the Reserve for Stabilization of Rates and Contingencies in a manner similar to the normal business practice of using a profit and loss account to absorb annual operating variances. The 13th bill had a use in the past when municipal utilities were billed at the full unadjusted cost for a year. At that time, the interim bills were based on expected costs and the 13th bill was used mainly to adjust the expected costs to the actual. In recent years, the costs to be recovered from municipalities have been predetermined. This has meant that, on average, the interim bills have almost equalled the amounts to be recovered for the year. The use of predetermined recoverable costs is expected to continue in the future. When costs were stable or declining, Hydro may have derived some public relations benefit in years when rebates could be paid to the municipalities. If this ever was an argument for the practice, it is not likely to have much force in the future.

Some municipal utilities have complained to us that the 13th bill requires them to balance their accounts annually while customers in the power district are allowed to carry forward an accumulated deficit. This complaint is valid to a degree, but it leaves an erroneous impression. At the end of 1971 the direct customers owed the rate stabilization reserve $4.6 million, down from $5.6 million in 1970. Thirteenth bills result in the municipalities "balancing their books" each year, but this is widely interpreted to mean that they pay their "actual" cost of power in that year as well. In fact, it is only through the operation of the stabilization of rates reserve that the major cost increases of recent years have been recovered. Table 17 reveals that in four of the last five years "special withdrawals" have been made for the benefit of the municipalities as well as the other customers. In 1971 the withdrawal for the benefit of the municipalities amounted to $19.4 million. If the 13th bill functioned as originally intended this amount would have been charged to the municipal utilities as part of the bill, clearly an unreasonable financial burden for them to bear.

In this context it is clear to us that the major adjustments between revenues received and costs incurred are borne by provisions to or withdrawals from Hydro's reserve account together with a relatively minor adjustment represented by the 13th bill. Thus the amount of the 13th bill is set at the discretion of the Commission and bears no significant relationship to the difference

TABLE 17

COSTS AND PROVISIONS AND WITHDRAWALS FROM THE RESERVE FOR STABILIZATION OF RATES AND CONTINGENCIES, 1967-71

($ Thousands)

	1967	1968	1969	1970	1971
Cost of primary power before reserve provision/(withdrawal)					
Bulk power cost	311,446	354,202	383,747	460,744	543,220
Retail distribution cost	43,264	47,022	49,519	55,742	61,724
Total	354,710	401,224	433,266	516,486	604,944
Amounts billed for primary power	366,716	414,962	468,930	534,426	606,749
Net provision/and interest—Reserve for Stabilization of Rates and Contingencies	12,006	13,738	35,664	17,940	1,805
The net provision and interest consists of:					
Interest added to the reserve	7,914	8,823	10,377	13,688	15,562
Calculated provision based on variations between actual and forecast loads and between actual and average steam flows	16,246	22,880	25,632	16,037	16,022
Special withdrawal to limit the impact of cost increases on the rate structure allocated to:					
Municipalities	(5,316)	(5,530)	—	(5,727)	(19,377)
Retail customers	(1,064)	(1,066)	—	(1,122)	(3,945)
Direct customers	(1,438)	(1,527)	—	(1,488)	(4,764)
	(7,818)	(8,123)	—	(8,337)	(28,086)
Net surplus or (deficit) on sales to:					
Retail customers	(1,805)	(3,020)	1,539	(3,637)	(3,024)
Direct customers	(2,531)	(6,822)	(1,884)	189	1,331
	(4,336)	(9,842)	(345)	(3,448)	(1,693)
Net provision and interest—Reserve for Stabilization of Rates and Contingencies	12,006	13,738	35,664	17,940	1,805

between revenue and cost in any one year. We cannot therefore accept the logic of the O.M.E.A's contention that the 13th bill does anything to guarantee Hydro's financial stability.

The 13th bill, as we have mentioned, results in different treatment for the municipal utilities and customers in the power district. This we envisage will cause increasing difficulty as Hydro is required in future to defend publicly its power costing and rate practices.

While we recognize the important role that the 13th bill has played in the past, as a symbol of the cooperation which has always existed between Hydro and the Municipalities, we feel that the practice has now ceased to be relevant and should be replaced by more up-to-date accounting procedures. We therefore recommend that:

> ***4.17 The practice of issuing 13th bills to the municipal utilities be discontinued.***

Thirteenth bills currently provide a mechanism for adjusting minor cost variations arising from delayed billings and charges for non-common facilities. The delayed billing effect can be mitigated by charging for electricity on an ongoing adjusted basis using the previous month's actual revenue requirement as the basis for the current month's estimate. Non-common costs will assume less importance in future, and in any event, the 13th bill adjustment could be eliminated by charging a rental for non-common facilities instead of incorporating such charges in the bulk power rate.

Rate Stabilization and Contingency Reserves

We have recommended in Section III a General Reserve account to replace the Reserve for Stabilization of Rates and Contingencies. Section 16 of the Power Commission Act describes the nature and general purposes of that reserve. The original purpose was to smooth out pronounced fluctuations in the cost of power from year to year due to variations in stream flow. Specifically it was not intended to offset long-term trends. The major part of the reserve has been held for the benefit of all Hydro customers, and additions or withdrawals affect all customers in proportion to their costing load.

Although the reserve has been used at the discretion of the Hydro Commission to cover any contingency, its principal function has been to stabilize the effects on bulk power costs of any variation in loads, as a result of an economic recession or other reasons, from the levels forecast when generating facilities were planned. Variations in stream flows, which impact on the amount of fuel required for thermal-electric generation, and exchange risks on debt payable in foreign currencies have also been provided for. Among the contingencies for which the reserve has provided a form of self insurance are: major losses on fixed assets arising from physical damage not covered by external insurance, major losses on the premature retirement of fixed assets

due to obsolescence and losses arising from the forced liquidation of investments before maturity. Some 90 percent of the reserve has been held for rate stabilization purposes and 10 percent for contingencies. Actual provisions and withdrawals to the reserve for the past five years are shown in Table 17. At December 31, 1972 the size of the Reserve was $249.2 million.

A relatively small part of the reserve ($18.3 million at the end of 1971) is held for the benefit of specific groups of customers. The portions held for direct industrial and retail customers in the power district are the accumulated surpluses or deficits on sales to these customers. The balance of these special reserves is held for municipalities and direct customers of the former Northern Ontario Properties.

The common cost function now identified as Reserve for Stabilization of Rates and Contingencies will remain, although as explained in Section III the operation of the reserve account will be modified. Implicit in this change is the recognition of the need to continue to provide for rate stabilization and for contingencies as just described, but to do so less mechanistically and within the framework of the financial policy we have recommended.

SECTION VII

THE TREND IN ELECTRICITY RATES IN ONTARIO

Retrospect and Prospect

As shown in Figure 2, there was no major change in Hydro's bulk power cost to the municipalities and power district between 1953 and 1967 and Hydro customers became conditioned to stable and sometimes declining electricity rates. Measured in current dollars, residential rates did not exceed prewar levels until 1969 (Figure 3). Between 1961 and 1971 the average cost per kWh to residential customers rose 18.7 percent, but during the same period the consumer price index jumped 33.4 percent. Adjusted for inflation, i.e., in constant dollars, residential rates in 1971 were some 10 percent lower than in 1961, 20 percent lower than in 1951, and more than 50 percent lower than in 1941. That is, actual residential rates in 1971 were lower by those percentages than what would have been expected had rates followed the same trend as the consumer price index. Between 1952 and 1971 the average cost per residential kWh supplied by the municipal utilities increased 24 percent to 1.34¢; the commercial average cost fell by 4 percent to 1.35¢ and the cost to small industrial customers rose 15 percent to 1.00¢ (Table 18).

Over the same interval average residential consumption more than doubled to 693 kWh per customer per month, average use per commercial customer increased 4.7 times and average industrial power demands increased 3.4 times.

Table 19 summarizes the results of an analysis of bulk power costs over the period 1967-71. It reveals that increases in fuel bills, caused by the combination of increased coal prices and the rapid relative growth of thermal generation, was by far the greatest cause of the increase in total operating costs. Operation, maintenance and administration costs and interest charges were in second and third place, respectively. Operation, maintenance and administration costs have grown steadily over the last few years, both in absolute terms and, contrary to what one might have expected in a growing system, as a percentage of net assets. Increases were found to arise mainly from the higher costs of labour and material which has a greater relative impact on the operation and maintenance of thermal stations than of hydro-electric stations. Increases in the ratio of these costs to net assets were the combined result of these increases and the addition of relatively low capital cost thermal capacity to a large base of high capital cost hydro capacity.

Today, with the rapid inflation of Hydro's costs frequent rate increases have become necessary. Since 1967 bulk power charges to Hydro's primary customers have been raised annually by amounts ranging from $2\frac{3}{4}$ percent in 1967 to 8.0 percent on July 1, 1972. On October 31, 1972 Hydro announced further rate increases to all classes, to become effective in the new year (Table 20). This dramatic escalation of bulk power costs in both current and inflation-adjusted dollars over the last five years is clearly shown in Figure 2.

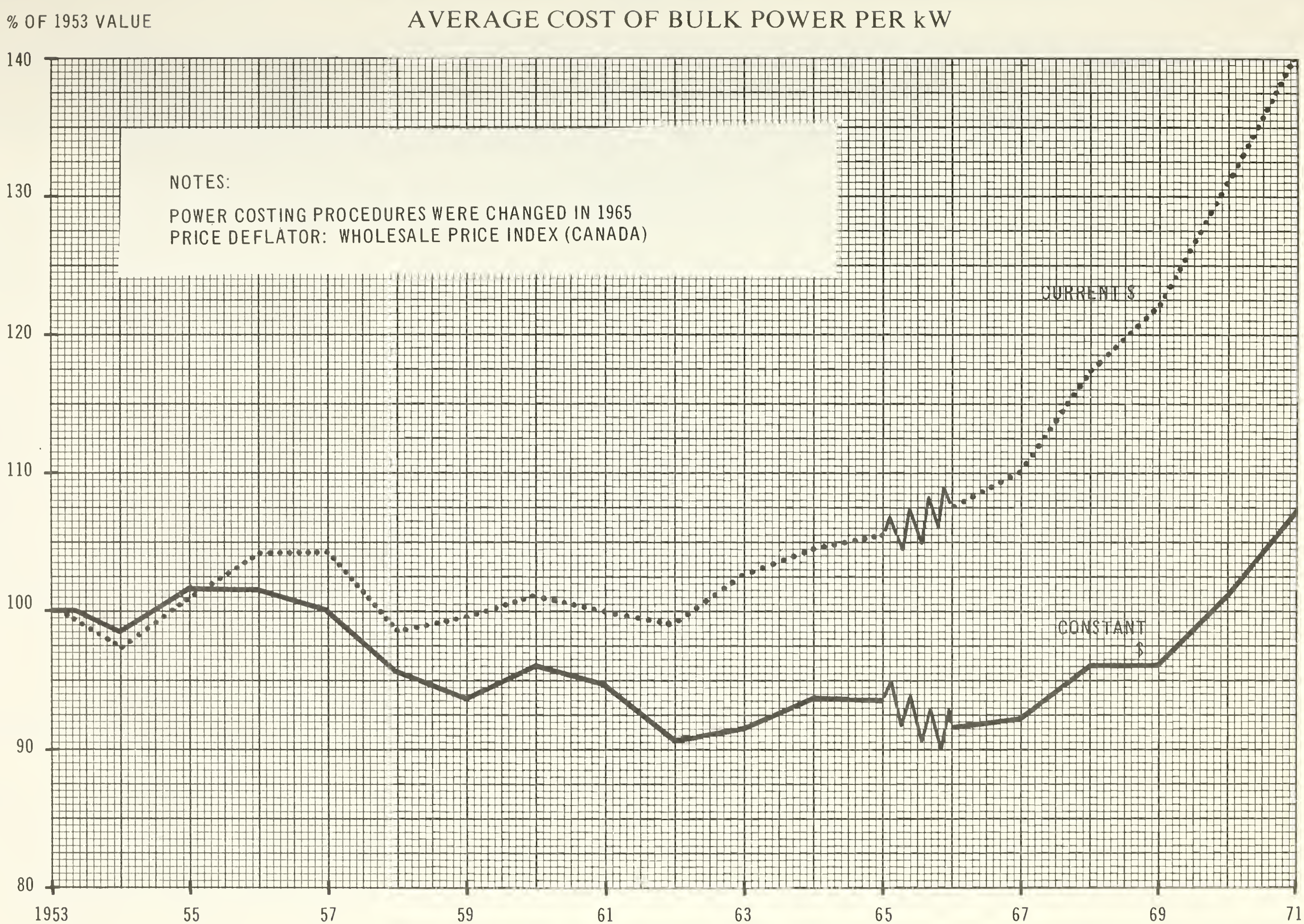

% OF 1953 VALUE
AVERAGE COST OF BULK POWER PER kW
140
130
120
110
100
90
80
1953
55
57
59
61
63
65
67
69
71
NOTES:
POWER COSTING PROCEDURES WERE CHANGED IN 1965
PRICE DEFLATOR: WHOLESALE PRICE INDEX (CANADA)
CURRENT $
CONSTANT $

FIGURE 2

RESIDENTIAL AVERAGE REVENUE &
CANADIAN CONSUMER PRICE INDEX

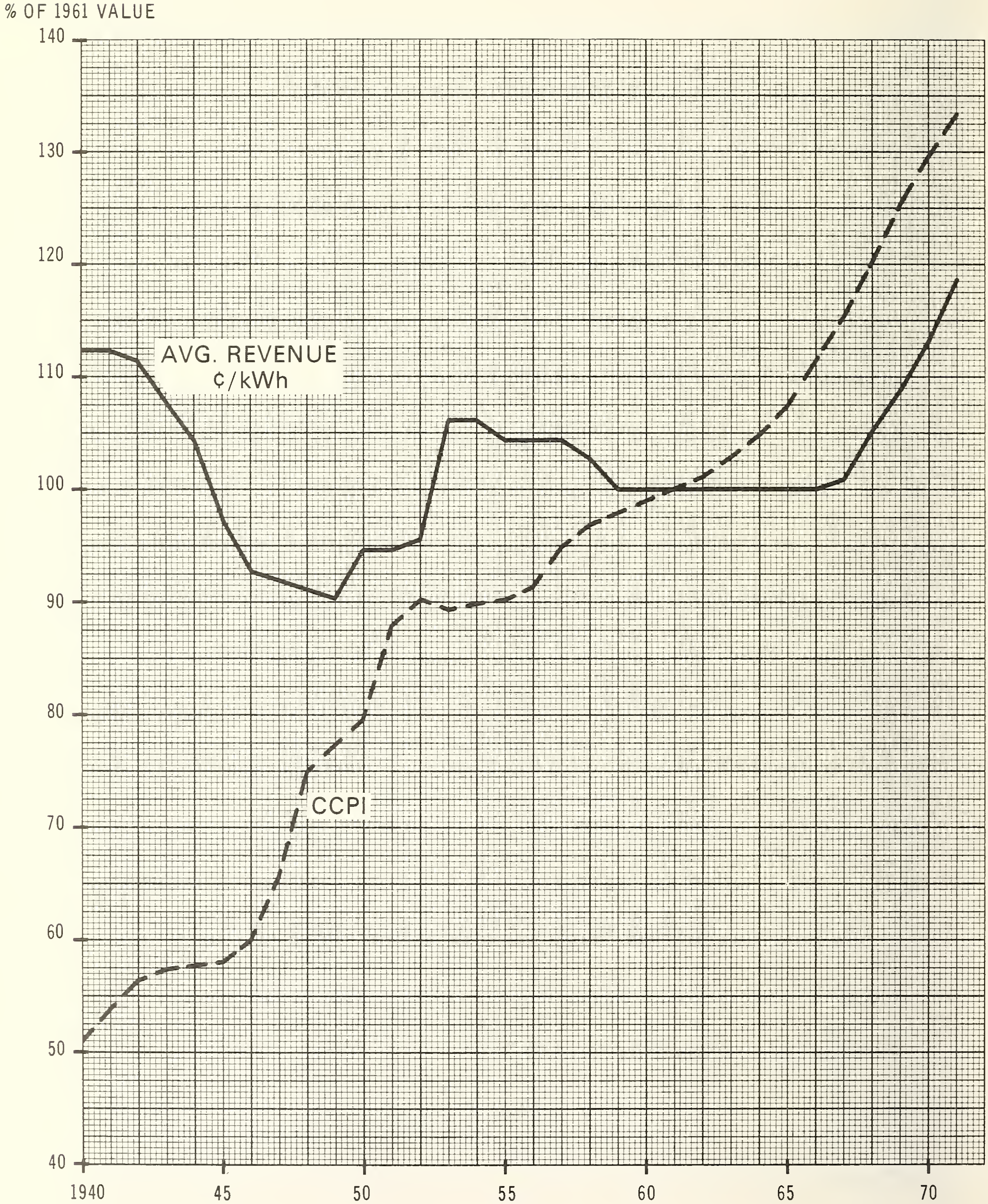


FIGURE 3

TABLE 18

MUNICIPAL ELECTRICAL SERVICE
CUSTOMERS, REVENUE, AND CONSUMPTION
1952-71

Service	Year	Revenue	Consumption	Customers	Monthly consumption per customer	Average cost per kWh	Year	Revenue	Consumption	Customers	Monthly average consumption per customer	Average cost per kWh
		$ Millions	Million kWh	,000	kWh	¢		$ Millions	Million kWh	,000	kWh	¢
Residential	1952	36.8	3,412	837	340	1.08	1962	89.0	7,853	1,346	486	1.13
	1954	50.8	4,247	931	380	1.20	1964	98.7	8,743	1,434	508	1.13
	1956	61.2	5,192	1,031	419	1.18	1966	114.5	10,103	1,506	559	1.13
	1958	69.8	6,036	1,139	442	1.16	1968	137.3	11,532	1,565	619	1.19
	1960	78.3	6,945	1,235	469	1.13	1970	162.8	12,723	1,596	667	1.28
							1971	175.9	13,112	1,587	693	1.34
Commercial	1952	19.5	1,387	115	1,003	1.41	1962	49.4	3,634	122	2,483	1.36
	1954	26.3	1,694	124	1,140	1.55	1964	58.2	4,461	126	2,961	1.31
	1956	31.4	2,081	127	1,360	1.51	1966	72.3	5,706	132	3,595	1.27
	1958	36.0	2,445	122	1,664	1.47	1968	92.7	7,255	151	4,154	1.28
	1960	41.2	2,922	123	1,972	1.41	1970	118.5	9,141	173	4,613	1.30
							1971	134.2	9,907	176	4,725	1.35
Industrial Power	1952	31.4	3,620	20	15,040	0.87	1962	74.2	8,705	23	31,342	0.85
	1954	40.9	4,090	22	15,726	1.00	1964	86.5	10,488	24	36,622	0.82
	1956	47.8	5,141	23	18,782	0.93	1966	100.3	12,078	24	41,939	0.83
	1958	52.7	5,652	23	20,409	0.93	1968	120.3	13,709	25	46,233	0.88
	1960	64.1	7,327	24	25,857	0.87	1970	150.6	15,753	25	51,791	0.96
							1971	171.0	17,171	27	54,855	1.00
General Service	1967	30.5	3,263	28	9,864	0.94						
	1969	65.0	6,479	65	9,506	1.00						
	1971	131.9	11,396	102	10,091	1.16						

1. Consumption for flat-rate water heaters is included in the table above on the assumption that these heaters are used for an estimated 16.8 hours per day.
2. In order to facilitate comparison with earlier years when there were no General Class customers, the data shown separately for this group for the last five years have also been allocated in the Commercial and Industrial Power Service categories roughly in proportion to the former relationship between these services.
3. Commencing in 1968, the method of calculating the monthly consumption per customer was changed. The new formula uses the average of the numbers of customers served at the end of the current and previous years.
4. Commencing in 1971, data relating to customers served through municipal systems operated by Ontario Hydro have been excluded from the above table and have been added to statistics under Ontario Hydro Retail Service.
5. Data for Small Commercial customers formerly included under Residential Service are now included under Commercial Service.

TABLE 19

CHANGES IN TOTAL OPERATING COSTS—BULK POWER SYSTEM, 1967-71

Total Operating Costs	Dollars per mWh 1967	Dollars per mWh 1971	Increase or Decrease Dollars per mWh	Percentage of Net Increase Attributable to Each Cost Element
Operation, maintenance and administration	2.01	2.55	.54	32.3
Fuel	.93	1.75	.82	49.1
Power Purchased	.26	.49	.23	13.8
Interest	1.49	1.87	.38	22.8
Depreciation	.77	1.03	.26	15.6
Debt retirement	.78	.77	(.01)	(0.6)
Nuclear Agreement—Payback to AECL and Province	—	.03	.03	1.8
Amortization of frequency standardization	.30	.32	.02	1.2
Sales of secondary energy	(.05)	(.36)	(.31)	(18.6)
Provision and interest—reserve for stabilization of rates and contingencies	.34	.05	(.29)	(17.4)
Total	6.83	8.50	1.67	100.0

TABLE 20

INCREASES IN CHARGES TO PRIMARY AND POWER DISTRICT CUSTOMERS, 1966-73

	%
Municipalities	
January 1, 1967	2.75
January 1, 1968	6.4
January 1, 1969	4.5
January 1, 1970	6.0
January 1, 1971	7.0
July 1, 1972	8.0
January 1, 1973	8.0
Large Directs	
January 1, 1969	10.0
January 1, 1970	8.0
January 1, 1971	8.0
January 1, 1973	12.0
Retail	
*Local**	
April 1, 1971	8.8
February 5, 1973	12.0
Rural	
October 1, 1968	9.3
November 1, 1970	9.0
February 5, 1973	10.0

*Municipal systems owned and operated by Ontario Hydro.

Bulk power costs will continue to increase faster than load growth throughout the 70's. Energy cost increases will be proportionately greater than increases in demand or capacity costs. A study prepared by Hydro for the period to 1977 shows that:

- Inflation, including higher labour costs and price increases for fuel, materials and purchased energy, could add about 15 percent to unit bulk power costs.
- The provision of new facilities, including escalation on construction materials and labour, and in particular increasing reserve margins, could add a further 40 percent to the average cost per kW.
- Although there are several other factors that will influence costs over the next five years, it is expected that the two foregoing factors will account for over 90 percent of the net change.

AVERAGE WEEKLY
RESIDENTIAL ELECTRIC BILL AND WAGE
(ONTARIO)

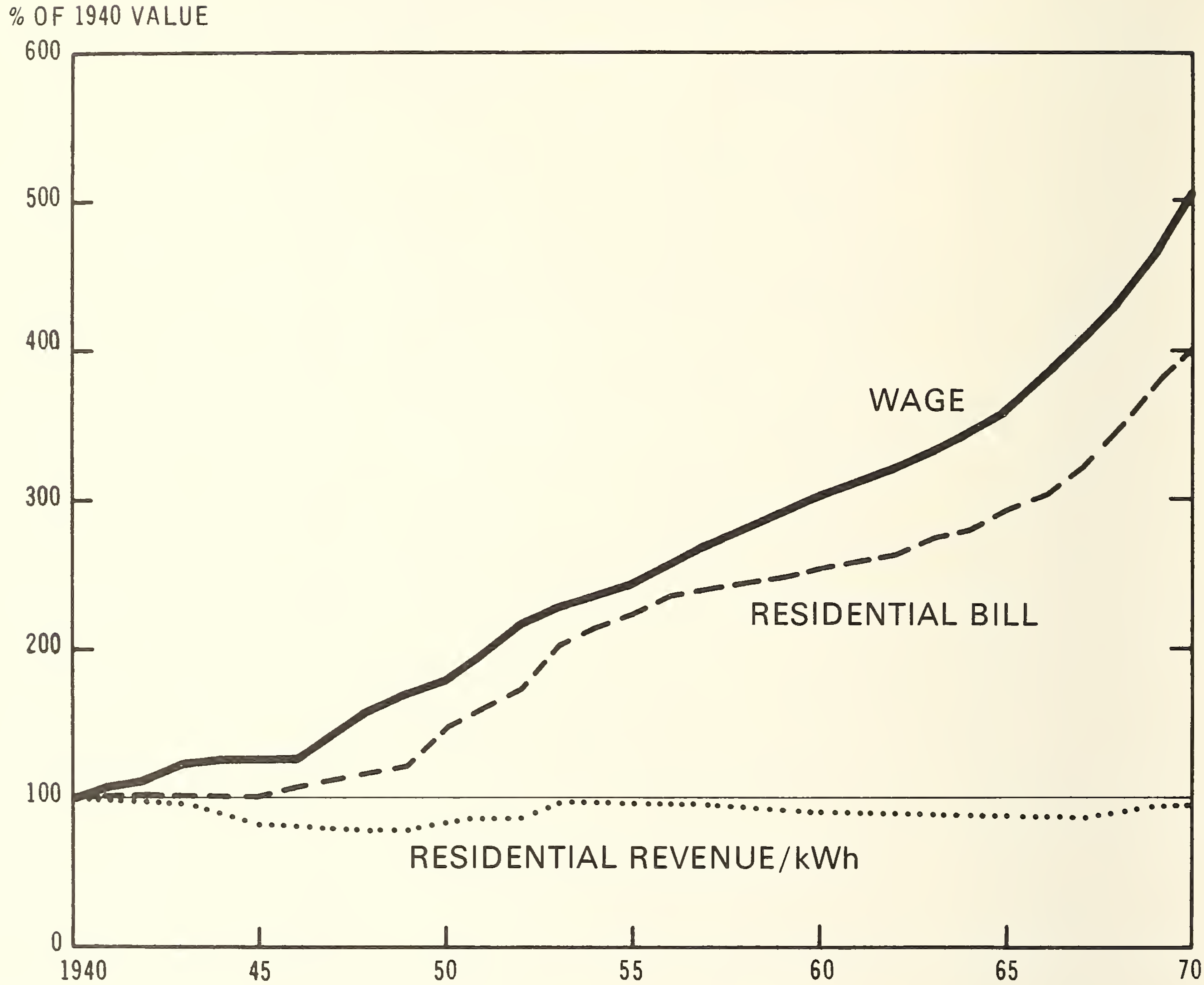


FIGURE 4

As we indicated earlier, Hydro has forecast bulk power rate increases averaging in excess of 8 percent per annum to 1977. Not surprisingly, such increases are promptly passed on to retail customers by the municipal utilities. The sharp upward turn in residential average revenues since 1967 is dramatically portrayed in Figure 3. Table 20 shows that power district customers, both direct industrial and retail, have faced similar increases in recent years.

For many years the trend in Ontario has been for electricity bills to residential customers to increase less than wages even though the average consumption of electricity per customer has increased many fold.

This comparison is illustrated in Figure 4 where it is seen that over the period 1940-70, although average weekly wages in Ontario increased 500 percent and residential electricity bills 400 percent, the average cost per kWh re-

TABLE 21

BULK POWER COSTS—PRIMARY ENERGY SALES, 1960-71, 1966-71[1]

	Unit cost (mills/kWh)			Annual percentage change	
	1960	1966	1971	1960-71	1966-71
Municipal	6.92	7.00	8.94	+2.4	+5.1
Retail[2]	8.20	7.19	9.12	+1.0	+4.9
Direct Industrial	5.52	5.24	6.92	+2.1	+5.7
(NBPUC)	(4.69)	(4.70)	(6.42)	(+2.9)	(+6.4)
Weighted Average	6.62	6.62	8.53	2.3	+5.2

[1] Allocated cost is shown for municipal and retail; revenues received for direct industrial and NBPUC. Costs include transformation charges, radial costs and reserve adjustments for the directs.

[2] Includes areas, local systems and industrial customers under 5,000 kW (from 1966) served directly by Hydro.

mained fairly stable, rising only 6 percent as a result of the very recent upturn previously noted. As a percent of wages, the electric bill dropped from 2.1 percent in 1940 to a range of from 1.9 percent to 1.6 percent since 1950, despite the four-fold increase in average residential power use implied by Figure 4.

Real economies of scale in the generation, transmission and distribution of electric power are the basic cause of this stability in unit costs. It is, however, by no means clear that the historic stability in the relationship of power bills to wages will survive the 72 percent increase in current dollar bulk power costs by 1978 that Hydro is forecasting. Increased costs must, of course, ultimately be recovered from customers.

The frequency of rate increases in the last five years, coupled with increased use, has led to a rising volume of high bill enquiries and complaints—an average of 3 per 100 customers per year based on statistics kept by Hydro's regional and area offices.

Hydro reports that most individuals who complain about high bills will accept an explanation based on the interaction of greater use and higher rates. Most customers are not aware of the extent to which their use of electric service has increased over the years. They therefore tend to attribute any increase to higher charges for electric service.

Hydro has also been subjected for a decade or more to continual lobbying from certain of its directly served industrial customers—generally the power-intensive ones for whom electric power represents an important element of their cost of production. Figure 1, page 46, indicated that increases in average revenues from sales to direct industrial customers have been generally similar to the increases in average bulk power costs to the municipalities since 1961. Average unit costs allocated to rural retail customers have, however, increased much less than the weighted average for all groups while average revenues received from the NBPUC, the most vocal group of power-intensive industries, have increased slightly more than the directs as a whole. Certain of the data on which Figure 1 is based are shown in Table 21. Elsewhere in this report (Section VIII) the charges of inequity in connection with these differential rates of increase are examined.

Comparison with Other Jurisdictions

Despite the across-the-board increases that have taken place in the last few years, Ontario power rates are competitive with those in other North American jurisdictions. Residential and small commercial customers, particularly, enjoy rates as low as any in North America. Table 22 reveals that in 1970 Ontario municipalities had 4 of the lowest monthly domestic power bills in Canada out of 7 selected consumption levels, all 9 of the lowest bills for commercial service and 3 of the 9 lowest bills for small power service. Table 23 shows that at the end of 1970 the typical Ontario residential bill was 8 percent below the Canadian average at 250 kWh/mo and 12 percent below at the more representative consumption level of 750 kWh/mo. Average bills in Manitoba were lower at both levels, however, and in Alberta at the 250 kWh level.

Figure 5 compares the average bill for residential consumption of 750 kWh for each state and for the U.S. total compared to Ontario. As of January 1, 1970 Ontario was lower than every state but Washington, which is in the Bonneville Power Administration's service area. It was also 39 percent below the U.S. average.

Unfortunately it is almost impossible to compare power rates to large industrial customers in the different jurisdictions because of the number of negotiated and usually confidential contracts. What evidence we received suggests that Ontario has lost most of the power cost advantages it once had for such customers (see also Section VIII), and there is some recent evidence that the balance has shifted somewhat against such customers relative to residential customers. No doubt this reflects, in part, the greater responsiveness that publicly-owned utilities traditionally have had to residential as opposed to industrial demands; and the corollary that industrial rates are usually lower, relative to residential rates, in the investor-owned electric utilities. We hasten to add, however, that there are in Ontario some valid, cost-justified reasons for this recent shift which are explored in Section VIII.

TABLE 22

LOWEST MONTHLY POWER BILLS CANADIAN MUNICIPALITIES, 1970

Lowest Monthly Bills for Domestic Service, 1970

	Monthly consumption—Kwh						
Municipality	100	250	500	750	1,000	5,000	7,500
Orillia, Ont.	$1.95	—	—	—	—	—	—
Kingston, Ont.	—	3.60	—	—	—	—	—
Winnipeg, Man.	—	—	5.76	—	—	41.81	62.40
Thunder Bay, Ont.	—	—	—	7.80	—	—	—
Ottawa, Ont.	—	—	—	—	8.45	—	—

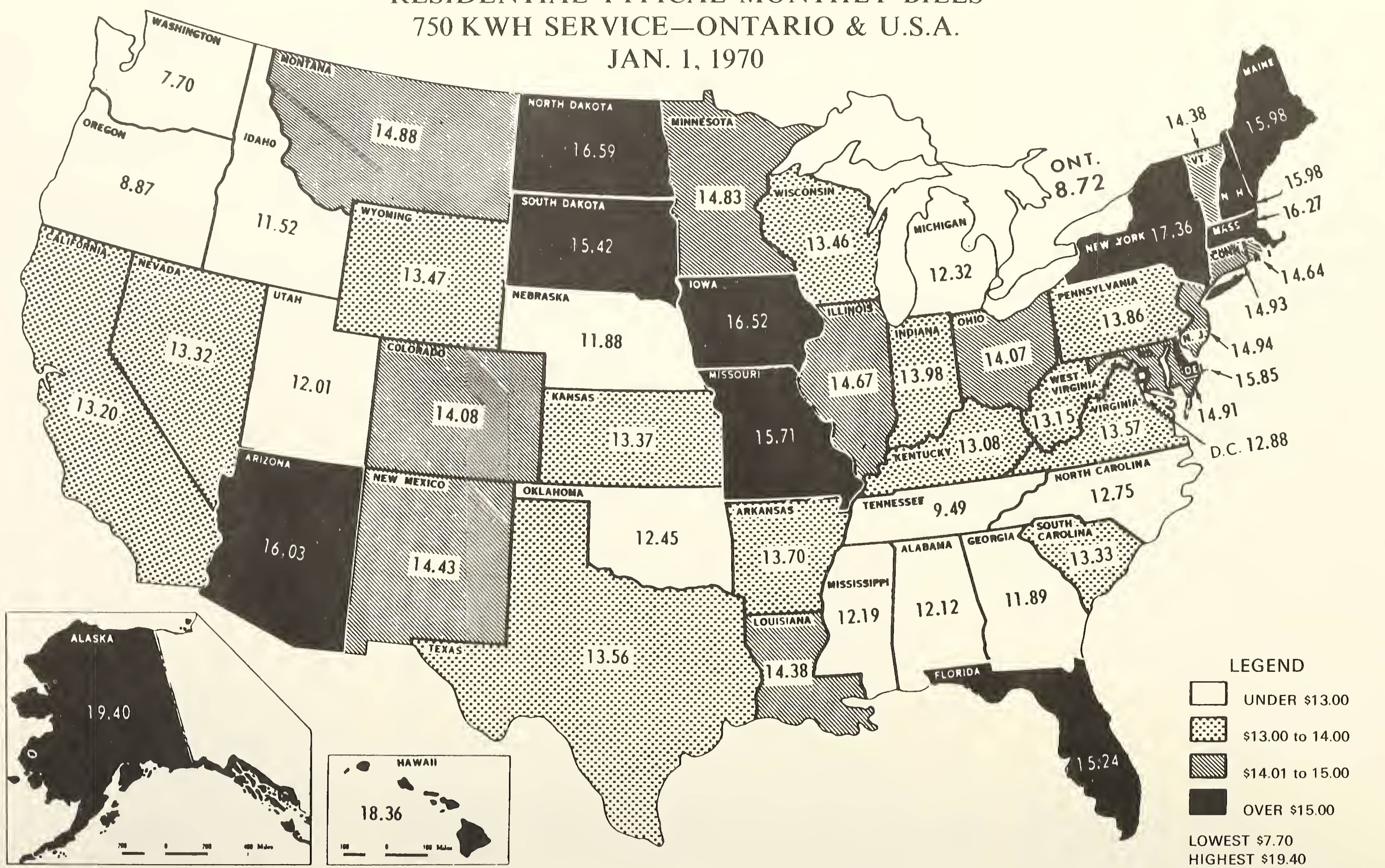
Lowest Monthly Bills for Commercial Service, 1970

	Billed load								
	2 Kw			10 Kw			50 Kw		
	Hours use								
	100	200	300	100	200	300	100	200	300
	Monthly Consumption—Kwh								
Municipality	200	400	600	1,000	2,000	3,000	5,000	10,000	15,000
Trenton, Ont.	$3.75	—	—	15.00	—	—	—	—	—
Timmins, Ont.	—	6.07	—	—	—	—	—	—	—
Kingston, Ont.	—	—	7.30	—	—	36.50	—	—	—
Thunder Bay, Ont.	—	—	—	—	27.95	—	66.95	131.95	156.95

Lowest Monthly Bills for Small Power Service, 1970

	Billed load								
	5 Kw			50 Kw			100 Kw		
	Hours use								
	100	200	300	100	200	300	100	200	300
	Monthly Consumption, Kwh								
Municipality	500	1,000	1,500	5,000	10,000	15,000	10,000	20,000	30,000
Trenton, Ont.	$8.00	—	—	—	—	—	—	—	—
Orillia, Ont.	—	13.25	—	—	—	—	—	—	—
Sault Ste. Marie, Ont.	—	—	14.22	—	—	—	—	—	—
Trail, B.C.	—	—	—	49.95	94.95	139.95	94.95	184.95	274.95

RESIDENTIAL TYPICAL MONTHLY BILLS
750 KWH SERVICE—ONTARIO & U.S.A.
JAN. 1, 1970



*Includes District of Columbia

FIGURE 5

TABLE 23

TYPICAL BILLS—RESIDENTIAL SERVICE
(AS OF DECEMBER 31, 1970)

Provincial Averages	Monthly Consumption of 250 Kwh	Provincial Averages	Monthly Consumption of 750 Kwh
	$		$
Manitoba	4.60	Manitoba	9.10
Alberta	4.73	ONTARIO	9.35
ONTARIO	5.07	Alberta	10.13
Quebec	5.63	Quebec	10.78
Saskatchewan	5.99	Saskatchewan	12.26
New Brunswick	6.11	Newfoundland	12.27
Newfoundland	6.54	Nova Scotia	13.32
Nova Scotia	6.64	British Columbia	13.71
British Columbia	7.40	New Brunswick	14.91
Prince Edward Island	8.24	Prince Edward Island	16.28
Canadian Average	5.52	*Canadian Average*	10.58

If there is any general warping of rates in Ontario, it is probably to the detriment of the larger commercial customers who have traditionally paid higher rates and have probably borne more than their share of system costs. Hydro is well aware of this and is attempting by a variety of means, including the introduction of a new rate form, to bring rates to such customers into line. As Table 18 shows, this objective is far from realized. Commercial customers are paying roughly the same unit rates today as residential customers, despite average consumption levels almost seven times as high. In general, under cost-justified rate schedules, average revenue per kWh sold to a given customer should fall as his consumption increases.

SECTION VIII

PRINCIPLES OF RATEMAKING

Criteria for Electricity Rates

The structure of electricity prices in any utility will influence the economy in two major ways. It will, first, transfer resources (money) from customers to the utility. Since both The Power Commission Act and our Report Number One envision a non-profit role for Hydro, aggregate rate levels or, in other words, total revenues must be no more than sufficient to recover total system costs. Governments are often tempted to utilize publicly owned enterprises to implement social objectives, for example to structure electricity rates so as to be lowest per unit for the low use, presumably less affluent, customers or for customers in economically depressed parts of the service area. There are, however, inherent dangers when a delivery agency of government, with a commercial mandate such as Hydro's, attempts to deal directly with questions of economic and social maladjustment. It is the responsibility of government to balance competing social priorities, but the prices of basic services like electricity should be governed by their costs of production.

Second, electricity rates influence the decisions of millions of citizens as to when and how they will utilize electricity. This is unquestioned, although years of debate have not yet settled the price, income and cross elasticities of demand for electric power. We now put forward our views:

- In the long run, significant price changes can exercise an influence on the quantity of electricity consumed by both residential and industrial customers. A long-term upward movement of real prices will therefore slow the rate of growth in demand for electricity. The short-run price elasticity, however, is minimal, at least within the range of prices experienced in the past. This is largely because expenditures on electric energy are related to the stock of electrical appliances and equipment on hand and tend to be quite small in relation to total household budgets or costs of production in industry. The cost of electricity for most manufacturing industries is less than 2 percent of the total cost of production, although in some power-intensive industries it is considerably higher than this.

- The income elasticity of electricity sales per customer is fairly low, meaning that the impact of real increases in electricity prices will be greater, relatively speaking, on low income customers.

- In many applications there is no close substitute for electric energy, but in the case of space heating there are good alterna-

> tives which, however, involve an investment in other types of utilization equipment. The competition, therefore, is sensitive to the combined relative prices of the fuel and the equipment. Recognition of a positive long-run cross elasticity with gas has been the driving force behind Hydro's marketing program since the Trans-Canada pipeline reached Ontario in the late 1950's.

One of the central themes of our Role and Place report is that Hydro's pricing and marketing policies must harmonize with those of the rest of the energy sector. This has not, in the past, been a central issue to Hydro. Stress has been put on what might be called the "service approach" to pricing. The following statement was contained in a document prepared for Task Force Hydro:

> "Hydro's rate philosophy is in line with its service motive of providing the customer with good electrical service at the lowest possible cost consistent with reasonable financial stability and environmental quality. Accordingly, rate structures are established in the overall long-term interests of the customers to encourage beneficial use of electricity".

No one can deny that the goal of a public power system, and of its rate philosophy, is to provide good service to the public. However in the face of rising power costs and enormous capital requirements for plant, it may be timely to subject Hydro's pricing policies to perhaps more rigorous tests of cost responsibility.

In the first place, power prices transmit signals to potential buyers and therefore, ideally, should reflect as accurately as possible the costs of producing and delivering that power. Ideally, when incremental costs of energy generation are high, as during the daily or yearly peak period, prices for use at that time should also be high. On the other hand, a pricing policy should encourage, through appropriate discounts, use at those times of the day or of the year when incremental energy costs are low.

Another function of power prices is to assist in determining priorities for investments in the energy sector and to help in the allocation of capital among competing uses generally. Proper rates, reflecting costs, which include a fair share of the social and environmental costs and a proper social opportunity cost for capital, are therefore essential if the market is to determine the resources that should be devoted to electricity production in Ontario.

We therefore recommend that:

> ***4.18 Ontario Hydro adopt a pricing policy that will more accurately reflect the supply cost of electricity, and that will give effect to government policies for the allocation of capital within the energy sector.***

Marginal Cost Pricing

If power rates are to be based on costs there still remains the question of how costs are to be defined. It is a well recognized principle of welfare economics that, subject to certain specified conditions, private decisions on consuming a particular good or service are in the public interest if the price of that good truly reflects its marginal socio-economic cost of production. More simply, prices must reflect the social cost of supplying additional power if the best possible approximation of an optimal allocation of resources is to be achieved. One important precondition is that prices for competing energy forms should also be established on the basis of marginal cost. Even though this probably does not apply to energy prices generally in Ontario, the applicability of marginal-cost pricing principles to the sale of electricity may warrant investigation.

The argument for relating electricity prices to marginal costs is based on the concept that the relevant cost is the avoidable cost, or that cost which would be incurred by expanding a given activity or which would be saved by reducing it. If consumers are to decide intelligently whether to consume more electricity, the price they have to pay should reflect the cost of supplying the additional amount. The primary objective and justification for marginal-cost pricing is to ensure that present and future system costs are closely reflected in the rate structure so that customers' choices as to the amount and timing of their electricity purchases are made on the basis of a comparison of costs and benefits.

Most North American utilities, including Hydro, have not generally adhered to marginal-cost pricing principles, but the concept is applied to some degree in some areas where prices are adjusted or discounts offered to reflect savings at particular times or under certain conditions.

- Short-term energy exports to interconnected systems are usually priced at incremental generation costs (i.e., short-run marginal costs), plus a 10 percent markup to cover intangible costs.
- For many decades both Hydro and the municipal utilities have offered flat rate water heating service on the basis that it was subject to controlled cut-offs during daytime peaks. Special off-peak rates are offered to community enterprises such as ball parks.
- Ontario Hydro offers Class "C" contracts which offer a 47.5 percent discount to companies prepared to reduce load during daily system peaks.
- Hydro recommends to the municipal utilities that they set the end or final block on their rates to small residential and commercial customers so as to recover the incremental costs of that service plus a contribution to overheads.

Marginal cost principles are attuned to the additional costs which are the natural outcome of system expansion. The same set of principles guide a marginalist rate philosophy and the discounted cash flow techniques of project appraisal. Thus a uniform costing philosophy based on marginal costing principles could result in the more efficient use of resources by Hydro and serve as a more rational basis for decision making whether or not rates charged reflect precisely the marginal supply costs. Ideally, if significant resources misallocation is to be avoided the rates must generally mirror the costs imposed on the system by increased power requirements.

In the long run, by the marginal-cost pricing theory, peak users impose costs on the system that off-peak users do not and, therefore, to be equitable this cost responsibility should be recognized in the rates. Should there be any elasticity at all to peak consumption, the resulting shift would improve system load factors, and could reduce costs. However, system conditions in Hydro are different from those existing in either France or Britain at the time these systems introduced marginal-cost pricing. In Ontario exceptionally high daily and annual load factors exist leaving less room for cost reduction through marginal cost incentives.

There has, in the past, been considerable theoretical discussion of whether prices should reflect short-run or long-run marginal costs. However, one expert's view is that, given correct forecasting of long-run capacity costs, the dichotomy is an unreal one. Simply stated, the marginal cost rule requires that the price of electricity at each time, place and voltage is set so as to recover the incremental energy cost involved in providing an extra kWh. This represents variable or avoidable cost and excludes fixed operating expenses and fixed charges on investment in plant. The long-run rule requires a payment for each kW of expected addition to "long-run" peak demand equal to the present worth cost of a kW of incremental capacity. Hence, for off-peak sales expected to remain off-peak indefinitely, long-run incremental costs would not include fixed charges. A rationing constraint is also required in the event that demand temporarily exceeds available capacity (including purchases). The constraint is that energy costs can rise to the level necessary to restrict demand to capacity. It is assumed that this is preferable to rationing via power cuts.[5]

As indicated above, short-run marginal energy costs provide a logical basis for pricing secondary sales to other utilities and long-run incremental capacity costs should be used in determining the discount applicable to interruptible and off-peak sales. However, some opponents of marginal-cost pricing as employed by utilities in France and Britain contend that for long-run commitments to supply firm power only long-run marginal costs should be used. In the previous paragraph we present the theoretical resolution of this point. In practice the British and French utilities have introduced certain modifications to the theoretical approach. Energy charges in Britain, for example, are based on short-run generation costs of stations "at the margin"

and are divided into day, night and peak costs, following the C.E.G.B.'s finding that no other differences in marginal running costs are of sufficient magnitude or stability over time to warrant recognition. Capacity costs are divided into peak and base load at 250 hours/year operation, since it was found that below about a $2\frac{1}{2}$ percent plant factor it was more economical to install high running cost/low capacity cost peaking plant. The annual cost of retaining old plant or building new gas turbines to meet short-duration peaks was calculated and taken as the cost of peak capacity. But rather than attempt to calculate a marginal base-load capacity cost, the cost per kW was set so that the total cost derived from the marginal structure would cover the total costs required to meet predetermined financial targets in any period. Thus, although not truly marginal, the capacity costs as defined are a step towards more accurate reflection of capacity cost differentials. The British are continuing their study of practical ways to redefine base-load charges so that they will reflect long-run marginal costs and not merely provide a way of covering total costs, but this is proving no easy task.

Opponents of marginal-cost pricing often argue that the principle of peak responsibility pricing is inequitable in that no demand costs are assigned to loads which are naturally off peak. For example, summer customers are completely off the peak of a winter peaking utility and yet were it not for the year-round customers, the summer customers could not be served. As we will see below, there is a further problem in allocating costs on a peak responsibility basis arising from the impact that a shift in time of the utility peak would have on individual customer's bills.

In practice, no rate structure can reflect costs with complete accuracy. A certain amount of averaging is inevitable among customer classes. In dealing with rates to customers using a few hundred kilowatt hours a month one must stop short of the point where the costs of metering and billing complexities begin to exceed any practical advantage. At the other extreme, the cost of administering even a quite complex rate structure would be trivial in the case of Hydro's direct industrial customers. The degree of rate complication that is cost justified and acceptable to customers must remain a matter of judgement and experience. The bulk power rate of Britain's C.E.G.B. probably conforms more closely to marginalist principles than any other major western power system, yet does so with only five components. It does, however, present complications to the smaller consumers, especially in Britain where time-of-day rates are optional. But as the former Chief Economist of the Electricity Council (to which the C.E.G.B. reports) observed:

> "The amount of information required to calculate the appropriate level and structure of a tariff is not necessarily less with a simple tariff than with a more complex one."[6]

At the present the municipalities and power district are billed on the basis of the average of their monthly peak demands regardless of the extent to which

they coincide with the system peak. This method is easy to apply and does provide an incentive to customers to improve their load factors. However it does not recognize the differing contributions to diversity, and hence to system capacity costs, of the various bulk power customers. The remedy lies in installing appropriate metering at all supply points to obtain load readings at the time of the system peak and billing accordingly. A study of 123 large public and private power systems in the U.S. revealed that although very few practice explicit marginal-cost pricing, some (though not the large public systems) are now basing their capacity or demand charges on use at the system's simultaneous peak.[7] This is also the practice of the national utilities in Britain and France.

A preliminary study revealed that the effect of such a scheme for Ontario Hydro would be to shift some costs from the larger municipalities to the smaller, from Northwestern Ontario municipalities to Southern Ontario centres and from the direct industrial group to retail customers in the power district. The difference in allocated bulk power cost in the most extreme case examined was under 3 percent. With Hydro's relatively flat daily load shape, the monthly peak could rather suddenly occur at 11.30 a.m. rather than its usual 5.30 p.m. which would shift a considerable burden of costs to industrial users, many of whom would be off the system in the late afternoon. The key is predictability. Capacity costs may be shared in varying proportions, from 100 percent down to zero to purchasers in periods that have correspondingly varying likelihoods of being, or becoming peaks in the foreseeable future. If an essentially flat daily load curve is predicted to continue, there can be little justification for appreciably different charges for a load which is low at 11.30 a.m. and high at 5.30 p.m. than for a load with the opposite shape. Considerations of fairness and rate stability must combine with those for system efficiency in all such matters.

It is thus recognized that the rigid application of short-run marginal-cost pricing principles can lead to undesirably volatile pricing behaviour, or what may be considered by some to be inequitable pricing practices. However, the French and British nationalized power systems now have considerable experience with the marginal-cost pricing in its essential features and it may be desirable for Hydro to experiment with higher demand charges in the winter months, as Electricte de France has done, or differential day-night energy charges following the C.E.G.B.

In summary, we believe that marginal-cost pricing principles hold enough promise to merit further study by Ontario Hydro. Hydro is free from the formal regulatory process which has been an obstacle to the introduction of more flexible pricing policies by North American electric utilities, and is therefore in a position to adopt some of the desirable features of marginal-cost pricing.

We therefore recommend that:

4.19 Ontario Hydro's research programs aimed at developing a uniform costing philosophy based on marginal costing be expanded to embrace studies of the feasibility and acceptability of:

(a) bulk power and retail rates that vary with the time of day and season of year,

(b) demand charges that are based on a customer's load at the time of the monthly or seasonal system peak rather than on his individual monthly peak.

Discriminatory Pricing

Price discrimination, as was pointed out in our Role and Place report, refers to the policy of charging differing prices to various classes of customers, among geographic regions, or among types of loads, where such price differences do not reflect corresponding variances in the marginal cost of supplying the electricity. In the previous subsection we noted that Hydro tries to keep its end rates to small customers on block rate structures close to incremental cost which implies that electric heating customers will make a smaller contribution, as a proportion of their total bill, to the recovery of fixed or embedded costs than other customers. This is price discrimination and its essence lies in fashioning charges according to what the traffic will bear, recognizing that differences in demand elasticities among customer classes mean that each class has its own capacity or willingness to bear charges. Fixed costs can therefore be distributed disproportionately among various groups and classes of customers. Public utilities have long included a value of service element in their rate philosophies, recognizing that through discriminatory rates they could improve load factors by expanding sales as long as there were buyers willing to pay at least the incremental supply price.

Clearly the recognition of the value-of-service factor is a deviation from the principle of cost-based rates that we have been at pains to emphasize throughout this report. Nevertheless, in our view discriminatory rate reductions may be justified if all the following conditions are met:

- The incremental cost of accepting the new business is less than the average system cost without it.
- A lower rate is required to elicit the additional business.
- The lower price results in an increase in total revenues sufficient to meet the additional costs incurred.

The limits to discrimination are, thus, that high-volume customers must pay the full additional costs and others cannot be charged more than they

would have had to pay in the absence of the contribution from the high-volume customers. This ensures that even though one group of customers may appear to be charged less than another for the same commodity, no cross subsidization is involved.

In Report Number One we considered further examples of discriminatory pricing covering such matters as the conditions under which service should be provided to remote communities in northern parts of the Province. We recognized that under certain circumstances the Government, in support of its regional development policy, may direct Hydro to offer discriminatory rates. But we felt strongly that such rates should not involve cross subsidization. This led us to put forward our Recommendation 1.9 to the effect that:

> . . . additional costs . . . should not be built into power prices but should be borne by subsidy from the Provincial Treasury.

In the following section on promotional rates we point out that declining block rates for retail customers are not by themselves unduly discriminatory, but that constant vigilance is needed to ensure that the block discounts do not lead to rates below incremental cost. Without benefit of the information which would come from peak load pricing and from greater emphasis on marginal-cost pricing it is difficult to judge how much price discrimination is desirable or justifiable. And finally, it is important to ensure that price discrimination does not lead to otherwise unjustified plant expansion.

Promotional Rates

Hydro's retail rate structures, employed in the power district and approved for use by the municipal distributors, are typical and conventional, consisting of a declining block rate to residential, farm, small commercial and industrial customers; a combination block/energy and demand rate for medium-size commercial and industrial loads from 50 to 5000 kW, and a two-part demand/energy rate for large industrial customers with loads over 5000 kW. To the degree that these rate schedules offer lower unit costs for increased consumption they may be considered promotional.

Within the power district Hydro currently charges residential users 3.00¢ per kWh for the first 250 kWh per month, 1.35¢ for the next 500 kWh and 1.15¢ for anything above 750 kWh. Customers with electric water heaters get a special 500 kWh second block at 0.90¢ and all-electric customers special rates for all use over 250 kWh per month. Save for some off-peak discounts (quite minor in overall impact) and some use of controlled water heaters, the rates are not related to the time of day or season of year and hence, have a tendency to underprice marginal sales at peak. The distortion is probably greatest in respect of residential service, the peak for which coincides roughly with that of the system. On the other hand, the block rate structure recognizes

the declining cost characteristics of electricity distribution. The advantages of promotional rate structure are:

- increased usage results in a larger, more efficient power system with system overheads spread over a larger number of units.
- users with high demand elasticities are charged rates close to incremental costs.
- low elasticity customers are charged rates lower than those possible without the contribution of the high elasticity users.

Increasing block rates

Conservationists now argue that consumption-promoting retail block rate structures should be reversed so that unit rates increase with increased use. The following benefits are suggested:

- rates would more accurately reflect marginal costs of electricity generation, which now exceed average costs.
- unnecessary and luxurious power consumption would be curtailed and pollution and environmental degradation would be reduced.
- the burden of increasing power costs would be shifted from lower income to upper income groups who, with their appliance-filled homes, consume the most power.

Of these three arguments, the first is probably the most valid. Long run average costs are clearly rising for the system as a whole, although an individual utility, which purchases all its power, is still able to reduce average distribution costs with increased load. The impact of reversing the rate blocks in the Hydro system would fall most heavily on electric water and house or space heating, the major uses associated with the two rate blocks which would be subjected to the greatest increases. Our study indicated that, unless some form of peak responsibility pricing is also introduced, the effect of reversing the block structure would probably be to reduce peak consumption somewhat, but off-peak loads even more, Thus, while the overall effect could be a slowing in the rate of growth of power demand, it is likely that system load factor would suffer so that average costs would rise.

The second argument presupposes a close correspondence between a residential user's total consumption and his use of luxurious electric appliances, whereas in fact, consumption depends mainly on family size and age distribution, income and the type of house construction. The argument also overlooks the fact that any decrease in electricity consumption would probably be offset by increases in the use of oil and gas. It is by no means certain that the overall impact of this shift in energy use would be favour-

able, and in fact the latest evidence indicates that in the long run, it would be unfavourable.

Thirdly, there would be serious problems in determining the social implications of increasing block rates. These cannot be assumed, invariably, to be progressive in a distribution of income sense. For example, it would not be progressive in the case of residents of all-electric public housing. In any event, in our Report Number One we suggest that the solution to such social issues is to be found in the income tax machinery or through income supplements, rather than through departures from cost-based electricity rates.

We recognized in Report Number One the desirability of incorporating the costs of environmental degredation in power prices. This will raise rates in a truer reflection of the social costs of power production, and is to be preferred to the increasing block proposal. We conclude that Hydro's descending block rate structure for residential, small commercial and industrial customers correctly recognizes the declining cost characteristics of power distribution, though not of power generation. Continued careful cost analysis, concentrating on the relationship of costs to volume of use, is therefore needed to justify each block discount.

As explained below, Hydro's unit generating and transmission costs are rising faster than unit distribution costs. This means that the end block rates, which are based principally on bulk power costs, should increase more rapidly than rates in the low-consumption blocks. This trend will be in the direction sought by the conservationists.

Appliance-related rates

Within its basic declining block rate structure, Hydro has another form of promotional rate based on stipulated appliance ownership. An "all-electric" rate on homes with no other energy source was introduced in the late 'fifties. Concessionary rates for water heating customers have an even longer history in Hydro. Flat rates for water heaters were once widely used but have generally given way to special low blocks for 250-750 kWh per month use in a four-part rate structure in the municipalities and a five-block structure in Hydro's power district.

Internal Hydro studies have shown that current end or final block rates should be increased to ensure that the incremental cost of service is covered, where cost is defined to include an allowance for electric space heating promotion. Furthermore, since special rates are applied by some utilities and not others they contribute to retail rate disparities across the Province and an inconsistency with the philosophy of the General Service rate which Hydro has promoted successfully for commercial and small industrial customers. Water heating blocks are responsible also for that rateman's nemesis, the "sawtooth" effect, whereby certain low usage customers are

able, by enlarging their consumption into the water heating block, to lower their total bill in contravention of all principles of cost justification.

Water heating revenues, both kWh sales and rentals, currently account for almost one-third of the revenues of municipal utilities. Because of the importance of this load relative to competitive energy suppliers, and the $60 million capital investment represented by close to half a million rental and time payment electric water heaters, rate changes would have to be introduced gradually. The all-electric rate results in a considerable number of cases in which owners of small electrically heated homes are charged average unit rates less than those charged to customers on standard rates with greater total consumption. Space heating peaks between 7 a.m. and 8 a.m. and about 70 percent of the load crosses the afternoon system peak. The load added about 1000 mW or 8 percent to the 1971 system peak, but because of its lower than average load factor, accounted for less than 5 percent of total energy consumption. On this basis the all-electric discount is not cost justified.

There is wide agreement within Hydro on the desirability of eliminating these anomalous rate forms even though, as shown in Figure 6, the impact would not be significant since most of the use is at the right end of the scale where the difference between standard and all-electric rates is minimal. For the reasons given, the special water heating blocks pose a more difficult problem. But in our view such rate practices constitute unjust rate discrimination and we therefore recommend that:

> ***4.20 Except where subject to controlled disconnections, special rates based on stipulated appliance ownership, such as all-electric or water heating rates, be phased out as quickly as possible.***

It is recognized that in fairness to the electricity suppliers of Ontario, the justification for appliance-related gas rates should also be most carefully reviewed by the regulatory authorities. This underlines the importance of our Recommendation 1.6 in Report Number One to the effect that Hydro actively participate in the development and support of Government policies with respect to energy and the environment.

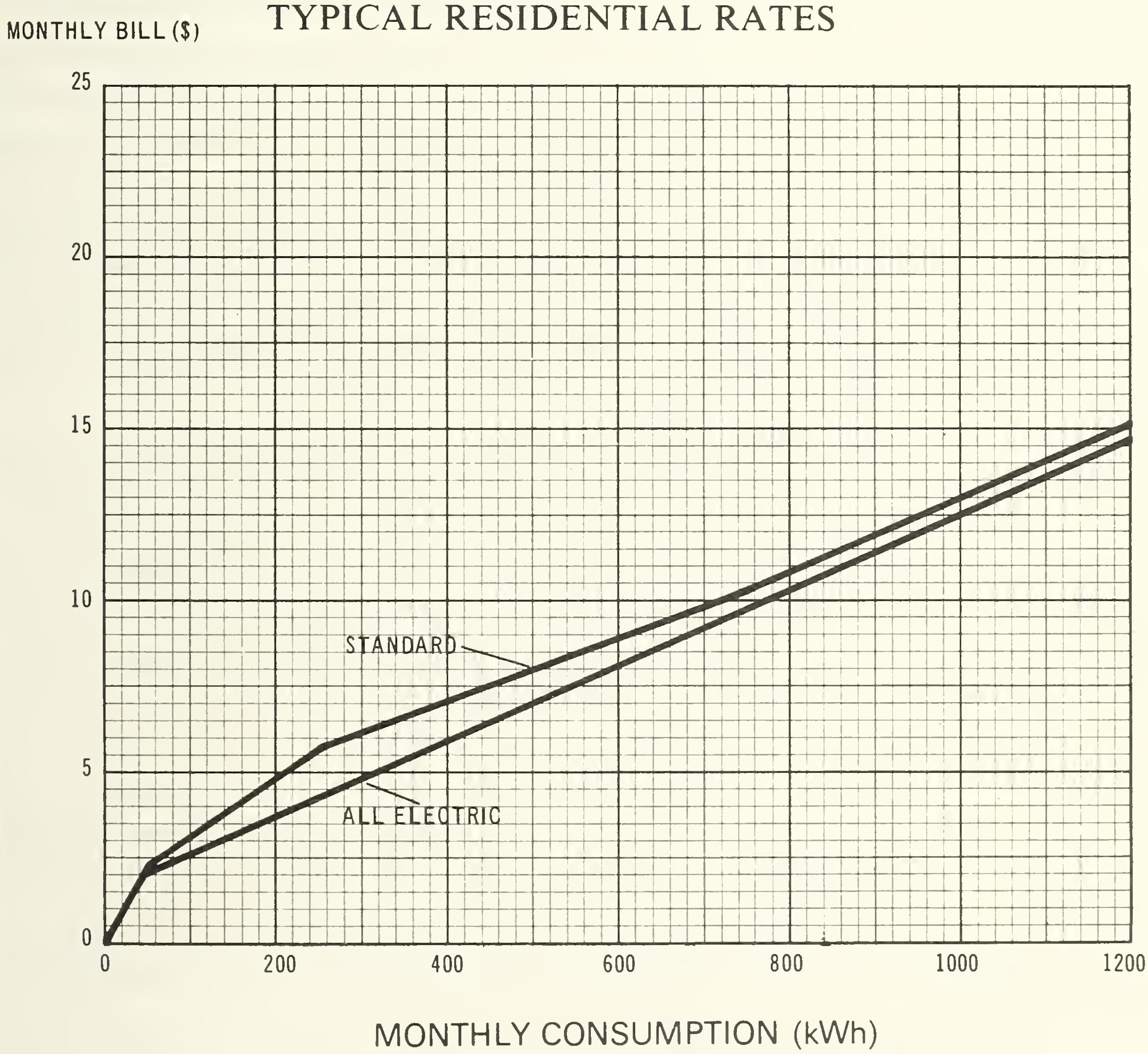
Volume Discounts for Large Customers

Hydro is under continuing pressure from large industrial customers, in particular those with high load factors, to grant discounts for high volume use. The problem seems to stem from the fact that Hydro may be at a cost disadvantage with respect to utilities in Quebec, Manitoba, and British Columbia, as well as the Bonneville Power Administration and TVA in the United States. These systems benefit from a high proportion of inflation proof hydro-electric generating capacity or have advantages such as cheap coal (TVA) or highly subsidized fixed debt costs (BPA) not available to Ontario Hydro. In time, as the size of Hydro's thermal generators, particu-

larly nuclear units, approaches those of TVA, differences in capital and operating costs should diminish and with them rate disparities. Furthermore, most of the remaining large undeveloped hydraulic sites are distant from load centres and thus require large capital expenditure for transmission facilities which would probably result in only marginal cost advantages over nuclear plants located near load centres.

Like TVA and BPA, but unlike most investor-owned utilities, Hydro follows a policy of publishing its industrial rates, thus ensuring that volume or other discounts are available to everyone. By contrast, B.C. Hydro offers discounts to certain resource-oriented industries, and Hydro Quebec grants rate concessions to new industries based on such criteria as contributions to employment and to provincial exports.

TYPICAL RESIDENTIAL RATES



Standard
First 50 kWh @ 4.5¢ per kWh
Next 200 kWh @ 1.7¢ per kWh
w Next 500 kWh @ 0.9¢ per kWh
Balance kWh @ 1.1¢ per kWh

w=for water heater customers only.

All-Electric
First 50 kWh @ 4.0¢ per kWh
Balance kWh @ 1.1¢ per kWh

FIGURE 6

In the last few years a few power-intensive corporations with plants in Ontario have claimed that non-competitive power rates have forced them to expand operations outside the Province. This should not suggest that power rates are inhibiting the overall industrial development of Ontario since for all but a few industries other advantages associated with locating in the Province more than offset slightly higher power prices.

On the basis of a detailed review of the principles whereby total bulk system costs are recovered from the primary power users, a Hydro study concluded that volume discounts to very large directly served industrial customers may be cost justified. An examination of the bulk power cost functions showed that the large direct customers were attracting certain costs in excess of the proportional benefits accruing to them. Sales and advertising expenses and certain administrative costs were the major items falling in this category.

The study suggested that a discount in the order of $1 to $2 per kW per year, or some 2 to 4 percent of the total power bill for an industry with a 70-80 percent load factor might be cost justified. The present overcharge was approximately equal to the diversity benefits enjoyed by the direct industries by virtue of their inclusion in the power district. Upon reviewing the logic of this proposal, we conclude that such discounts appear to be reasonably cost justified. We do not believe that recipients of such discounts should be required to sacrifice the advantages they enjoy by virtue of being in the power district.

The same report also recommended reductions of 5 to 10 percent in the demand charge for that portion of the load above a selected blocking point. This was justified on the basis that the larger industrial customers contribute proportionately more to economies of scale *on the bulk generation and high voltage grid system* than do small customers. We disagree on the grounds that, assuming comparable load factors, the bulk power system cannot distinguish between a single large industrial load of, say, 50,000 kW and the integrated demand of 25,000 residences each with a 2 kW load. Thus no customer contributes proportionately more, on a per kW basis, to the system's ability to realize scale economies than does any other. There is, in this sense, no argument for scale economies or justification for volume discounts.

Volume discounts to large industries inevitably involve some shifting of charges either:

- to smaller directly served industrial customers,
- to power district customers in general, or
- to all Hydro customers including those served by the municipal utilities.

We favour the third alternative as the increase would be most widely diffused. The extension of such discounts to large industrials also raises the question

of similar treatment for large municipalities whose loads can amount to as much as 10,000 times that of the small ones. This question was debated years ago, with the O.M.E.A. fully supporting "equal" treatment for all municipalities regardless of size. TVA and other public systems have similar policies.

This issue raises the further question of the continued justification for different rates to large customers with similar loads depending on whether they are served by Hydro directly or by a municipal utility. There is a move in Hydro to standardize such rates across the Province, the precursor of which may be a recent Hydro decision to grant interruptible discounts to large industrial customers of the municipal utilities. Any policy to grant volume discounts should apply to all qualifying industrial loads regardless of the supply authority. But the option of granting volume discounts to the larger municipal utilities should be foreclosed. We lean to the view that the objective should be consistent treatment of the ultimate customer rather than of the distribution agencies. Further, to the extent that the justifications for a discount to the large industrial loads is based on their overassessment for sales and advertising expenses, there is no argument for a discount to the municipal utilities which presumably stand to gain the most from this class of expenditure. Volume discounts to large municipal utilities would quickly be reflected in retail rates, further aggravating the rate disparity among municipal utilities which is already an important issue in Ontario.

We conclude that modest volume discounts to large industrial customers are cost justified and we therefore recommend that:

> ***4.21 Discounts reflecting savings in marketing and certain overhead costs be granted to all large industrial customers in the form of a step reduction in the demand charge above a selected blocking point, the cost of such discounts to be spread throughout the system.***

Special Long-Term Contracts

As we have indicated, for most residential, commercial and industrial customers electricity bills constitute a relatively modest percentage of disposable income or cost of production. Most such customers do not wish to incur a long-term contractual commitment to purchase power, but prefer to remain free to obtain and discontinue service at their convenience. Some older contracts between Ontario Hydro and the municipal electrical utilities do contain minimum purchase clauses but these are not enforced and the newer contracts contain no contractual commitment to purchase electricity from Hydro, other than as and when the retail customers of the utilities require it.

For some industries, however, particularly those that are large and power intensive, the cost of electricity may be a very significant factor, and where

large investments are being made by an industry and by Ontario Hydro in serving it, both parties require long-term commitments to buy and sell power. All direct industrial customers now in fact are served under "take-or-pay" contracts where the minimum bill is set at 75 percent of the greater of the average of the 11 previous months' costing load or contracted demand. There are further protective clauses covering such matters as supplementary and standby power.

Some large industrial customers have insisted that their contracts include rate clauses that would reduce the element of uncertainty now associated with Hydro's policy of retaining the right of unilateral price adjustments. They argue that it should be possible to agree on an index or indices to which rate adjustments can be pegged. We take the position, however, that no index can be devised which is more comprehensive than Hydro's bulk power cost itself, on which the direct industrial rate is now firmly based. Subject to Recommendation 4.21 regarding volume discounts, we maintain that this should continue to be the case. As we will argue in Section IX, we feel that Hydro should be prepared to make known its forecast of trends in the bulk power rate for three years into the future. It may be noted in this connection that TVA retains the right of quarterly rate review in all its industrial contracts.

Finally, we regard Hydro's policy of published rates, uniform to any customer with specific load characteristics, as far preferable to the alternative of secretly negotiated rates.

Unit Costs to Residential, Commercial and Industrial Customers

Several briefs to Task Force Hydro gave the impression that some groups of bulk power customers believe they are being forced to subsidize other groups. Perhaps the major reason for this contention is that unit costs of local distribution have in the last few years continued to trend downward, in marked contrast to the behaviour of bulk power system costs. This is a condition which applies today to most reasonably fast growing integrated power systems. Hydro passes on bulk power cost increases *pro rata* to all primary customer groups, but since bulk power charges comprise a smaller proportion of the total cost of power to retail customers of the municipal utilities or the power district than to the direct industrials, the former customer class experiences a lower percentage rate of increase than the latter. Despite this, it does not follow that the direct industrial customers have been discriminated against since it is not valid to compare direct industrial rates to those charged to retail customers.

Another explanation of this variance in rates of increase lies in the declining block rate structure for retail customers. As consumption of residential and small commercial and industrial customers increases, average costs per kWh decrease resulting in a relatively slow rate of growth of retail power rates.

On the other hand, large industries subject to demand/energy rates can achieve similar results only through increases in load factors, which is difficult to accomplish since most already operate at relatively high load factors.

Where changes are made in retail rate structures, such as occurred with the introduction of the General Rate in 1967, temporary disparities in rate increases can be significant. In Section VII we observed that the average unit cost to commercial customers of the municipalities decreased between 1952 and 1971 while rates to all other classes increased. This is shown in Table 18, page 63, which also reflects Hydro's efforts to bring the commercial rates into line with those for residential customers.

Power rates to the direct industries and wholesale charges to the municipal electrical utilities have been increasing at different rates. Table 21, page 67, reveals that there has been some disparity in the rates of increases among these primary customer groups over the period 1960-71. Subsequent to the 1965 costing revision, these disparities have narrowed. The two consistent deviations were that rates to rural retail customers increased less than the weighted average for all classes of primary customers over both periods, whereas rates to the NBPUC, a subset of the direct industrial class, increased more than the average.

Because their surpluses and deficits are carried forward in the rate stabilization reserve, the rates charged in any one year to power district customers, which includes the direct industrials and rural retail, do not necessarily reflect precisely their share of allocated costs in that year. In the long term, however, because of the way bulk power charges are recovered, there can be no major discrepancy in the rate of increase in costs of power to the municipalities or directs. The rural retail class will, of course, be affected by the trend in distribution costs.

The large reduction in allocated wholesale cost to rural customers in 1966, shown in Figure 1, page 46, resulted from a decision by Hydro, made after detailed discussions with the O.M.E.A., to reduce the disparity between municipal and rural rates and to bring greater diversity benefits to the direct industrial customers. On the other hand, the somewhat greater than average increases to direct industrial customers since 1966 and to the NBPUC since 1961 (Figure 1 and Table 21) seem to have arisen from the interaction of the following factors, not all of which affected all direct industries:

- expiry in the early 'sixties of some long-term low price contracts with the direct industrials,
- the greater degree of cost pooling since 1961,
- an increase in the proportion of 60-cycle to 25-cycle power,
- some decrease in load factor for some large industries,

- some increases in the use of firm versus interruptible power,
- some "catching up" on reserve withdrawals made to ease the transition to the new costing system in 1966 and 1967,
- inclusion in the rural retail rates of a distribution cost element which, as previously noted, has not increased in proportion to the bulk power component.

Cost pooling, as we have already pointed out, is a concept with which we agree, and the remaining factors are cost justified. We therefore feel that there has been no unjust discrimination against the direct industrials or the NBPUC.

Retail Rate Differentials

Briefs to Task Force Hydro commented on the issue of retail rate disparities. Concern was expressed over rate differentials among the large industrial customers, among the various municipalities, and between rural and urban customers. A number of specific problems were cited:

- Rate levels and rate increases in some recently formed municipalities have proved to be higher than those occurring in the power district, contrary to original expectations.
- Industrial customers of the municipal utilities complain about rates higher than those to users with similar loads in the power district.
- Rates to identical classes of customers vary widely between adjacent municipalities.

Figure 7 reveals that, considering only the larger Ontario municipalities, residential electricity customers pay more than twice as much for the same amount of power in some centres as they do in others.

Some measure of the differential in the cost of a 70 percent load factor kilowatt to industries with a demand in excess of 5000 kW served by Hydro and the municipal utilities, is provided by Table 24. The median rates for industry served by the municipalities are not that much higher than for the power district, but there is considerable dispersion due mainly to differences in the return on equity and in the degree of diversity of the large industrial loads and that of the municipality as a whole.

In accordance with The Power Commission Act, municipal utilities adapt their individual retail power rates to suit local conditions, subject to Hydro's review and approval. Hydro's concern is at least twofold:

- In its review of capital and operating budgets Hydro compares expenses under the control of the utilities. In cases of high expendi-

ture, Hydro may suggest economies aimed at stabilizing rates. Where controllable expenses seem too low, questions are raised to ensure that service standards are adequate. Hydro accepts, and we concur, that a limited variation in local distribution costs is a modest price to pay for the benefits of local autonomy. The problem is to keep the variation within reasonable bounds.

- Hydro also scrutinizes the rate schedules to ensure that favoured treatment is not being given to one class of customer at the expense of another.

No review of retail rate differentials would be complete without consideration of such items as return on equity and frequency assessment charges which are major causes of disparity in bulk power charges. We have recommended earlier that return on equity be phased out as soon as possible. The frequency assessment charge will be fully amortized in 1974 after which it will no longer contribute to rate disparities. Other causes of retail rate differentials at the bulk power level have been referred to in our discussion on common costs.

TABLE 24

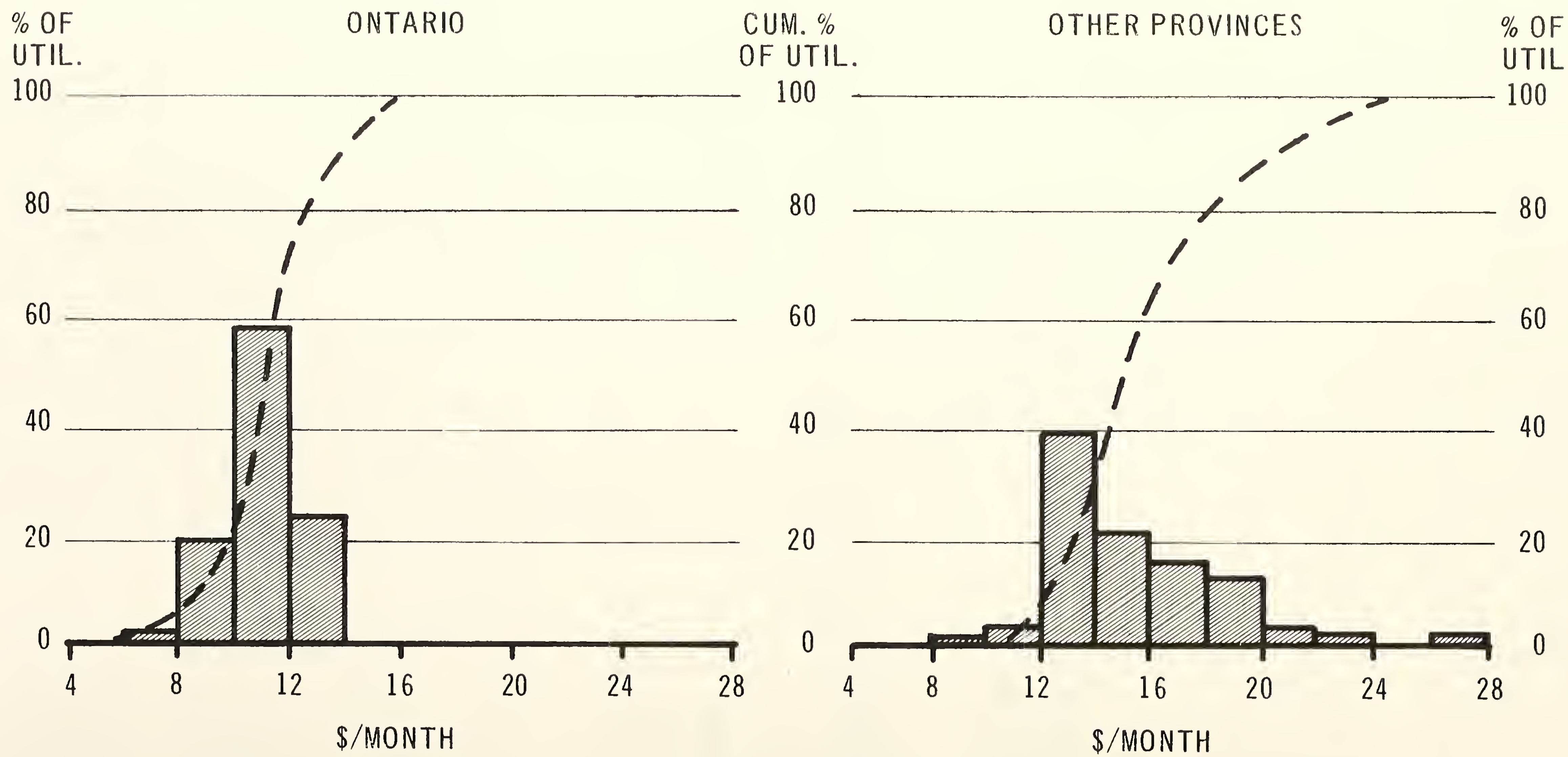
NET MONTHLY RATES TO LARGE INDUSTRY FOR 500 HOURS USE (SUB-TRANSMISSION VOLTAGE)

Non-Frequency Assessed	Effective Date	Demand Charge	Energy Charge	Monthly Bill/kW
		$/kW	¢/kWh	$
Direct customers of Hydro	January 1, 1971	2.55	3.0	4.05
Oshawa	July 1, 1971	2.75	3.6	4.55
Brockville	March 1, 1970	2.30	3.0	3.80
Peterborough	January 1, 1972	2.55	3.0	4.05

Frequency Assessed*	Effective Date	Demand Charge	Energy Charge	Monthly Bill/kW
		$/kW	¢/kWh	$
Direct customers of Hydro	January 1, 1971	2.77	3.0	4.27
St. Catharines	January 1, 1972	2.75	3.6	4.55
Welland	September 1, 1970	2.15	4.7	4.50
Oakville	February 1, 1972	3.10	3.8	4.98
Port Credit	May 1, 1971	2.70	3.7	4.55
York	May 1, 1971	2.60	3.8	4.50
London	October 1, 1971	2.60	3.5	4.35
Windsor	March 1, 1971	2.60	3.5	4.35
Hamilton	March 1, 1971	2.10	3.9	4.05
Toronto	March 1, 1971	2.62	3.4	4.33

*22¢/kW/month extra.

TYPICAL RESIDENTIAL MONTHLY BILL (1000 kWh)
(DEC. 31, 1969)



Low— 6.86	Low— 8.69
High—13.95	High—26.36
Ratio of High to Low— 2.03	Ratio of High to Low— 3.03

Source: D.B.S. Publication 57-203, *Electricity Bills 1969.*

FIGURE 7

Our studies have revealed that variations in the internal expenses of the municipal utilities contribute considerably more to variations in retail rates than do differences in bulk power charges. Thirty-nine municipalities managed in 1970 to keep their internal expenses below 25 percent of their bulk power costs, but for 35 others internal expenses exceeded 50 percent.

Rate disparities arise also from the fact that in the past the smallest municipalities have found it difficult to raise debt capital. Major rate increases were therefore often required to finance expansions. The broadening of the terms of the O.M.I.C. Act, discussed in Section IV, should provide future relief. A further contributor to retail rate disparities is the growing practice of municipal utilities to require that the entire capital costs of new subdivision service be borne by the developers. We discuss this matter below.

Retail rate differentials are aggravated by the number and variety of rate schedules in existence across the Province. Although there is a fairly high degree of uniformity in residential rate *structures* now employed by the municipal utilities, i.e., in the number and size of the rate blocks, variations within the blocks result in more than 200 different rate *schedules*. To give some impression of the range of schedules just within Metropolitan Toronto's six utilities and four neighbouring systems we plotted residential bills for various monthly and annual consumption levels. For illustrative purposes we show in Figure 8 the two extreme utilities; Toronto and the remaining seven utilities falling somewhere in between them. The disparity in electricity bills for identical consumption levels is obvious. In the typical consumption range of around 750 kWh/month Oakville customers paid $3.26 more than customers in York.

In our view all of this indicates that Hydro could have been more effective in pursuing its stated objective of reasonable rate uniformity. It suggests that Hydro may have been more concerned with the overall level, than with the detailed design, of the municipal utilities' residential rates. Nevertheless Hydro deserves credit for convincing over 300 municipalities to join the power district in applying a General Rate which has eliminated classification problems and simplified billing and administration, although in common with the residential rates, there is a considerable variation within the rate blocks. There remains, therefore, the considerable administrative inconvenience which arises from the profusion of schedules. Currently, Hydro is processing 200 or more applications from the municipalities for rate increases each year, each involving new schedules, and each requiring a separate examination.

We have examined the TVA approach, in which municipalities are required to choose one of 10 residential and 10 basic general service schedules. Only one residential structure is allowed (four block), all the variation consisting of in-block price differences. This system has many advantages and it provides a useful model for Hydro, although it is recognized that its implementation

RESIDENTIAL CUSTOMERS
TYPICAL NET BILL
JULY 1, 1972

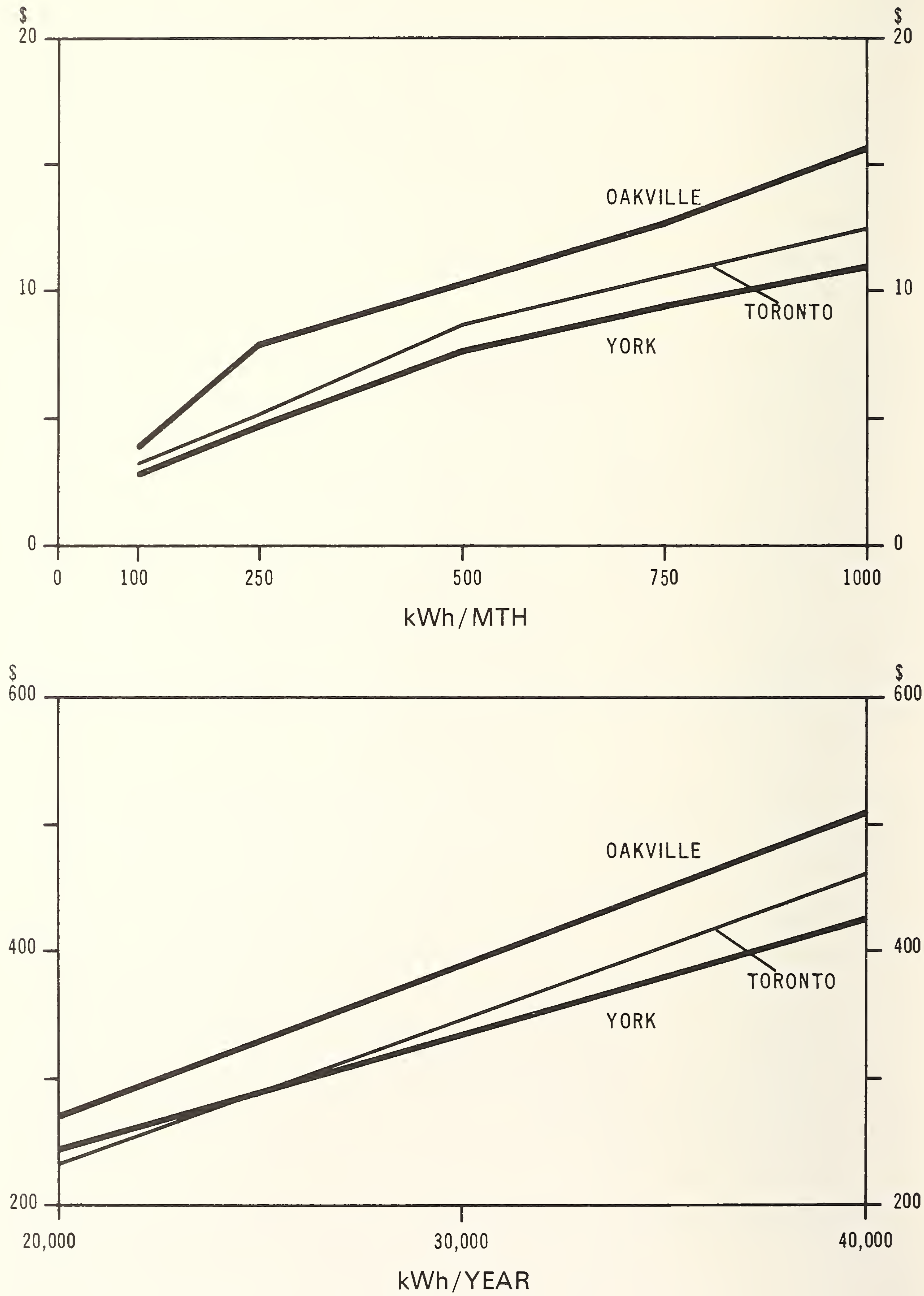


FIGURE 8

would have to be carefully phased so as not to require precipitous adjustments of the rates of the municipal utilities at the extremes of the array.

Implementation of other recommendations in this report, which will have the effect of reducing substantially the existing variations in bulk power charges will assist measurably in the establishment of a reduced number of retail rate schedules. We therefore recommend that:

> ***4.22 Hydro reduce the number of standard residential and general service rate schedules to about 15 each, from which municipal electrical utilities would agree to choose in order to fulfill their revenue needs.***

To ensure fair treatment of all customer classes, residential and general service schedules should be required to "match up" within prescribed limits. In view of the present wide disparities between residential and general rate levels for loads of similar sizes, it is recognized that this will be no easy task. If such schedules were available, municipalities could move, semi-automatically, from one to another as their overall revenue requirements changed. It is proposed that in future minor municipal rate adjustments need receive only administrative approval and need not invariably be taken, as at present, to the Hydro Board.

We envisage the schedules being established by Hydro in close cooperation with the municipal utilities. Implementation should be proceeded with in phase, with future requests for rate increases from the municipal utilities.

Our feeling is that greater uniformity of rates and conditions of service to all major industries in the Province, whether served directly by Hydro or by the municipal utilities is highly desirable. Having opted for a uniform bulk rate philosophy, Hydro must ensure that rates for bulk power service are independent of the customer's supply authority.

Again we feel that TVA's approach provides a useful model. TVA requires its municipal distributors to serve all industrial loads within their boundaries in excess of a traditional limit of 5000 kW at the direct industrial rate. This is easier to apply in the TVA area where rates to the direct industries are higher than to municipalities with equivalent load characteristics, the reverse of the Ontario situation. Some concession may therefore have to be offered by Hydro to a smaller municipality which finds that it is unable to provide service to a large industrial load at the direct rate. We therefore recommend that:

> ***4.23 Rates and conditions of supply be made as uniform as possible for all industries in the Province above a 5000 kW load, whether served by Hydro directly or by other suppliers.***

The two foregoing recommendations have been put forward with the object of minimizing retail rate disparities. It is hoped they will reinforce Recom-

mendation 1.24 previously put forward in Report Number One to the effect that a common point of interface be established between wholesale and retail functions.

We envisage the implementation of these recommendations being achieved through appropriate agreements incorporated in future contracts between the municipal utilities and Ontario Hydro.

Capital Contributions by Developers, Builders Promotions and Allied Matters

Capital contributions by developers

An increasing number of municipal utilities, often at the direction of the municipality, now require a developer, builder or subdivider to put up the entire capital cost of electrical distribution services. Such charges, ranging up to $800 per lot for underground distribution, are passed on to the new resident through a higher purchase price or higher rent. Naturally this benefits the municipal utility by reducing the amount of capital which it must raise.

The problem is that the purchaser or renter of a house in such a subdivision is paying twice for these facilities, since no differential is allowed in the retail power rate in those areas where capital costs have been prepaid by the purchaser through the developer. The standard retail rate includes a cost for financing the distribution system so that the new customer is paying more than existing customers for the same service.

In some municipalities there is a by-law, or the utility has an established policy, requiring underground distribution systems in all new subdivisions. Hydro estimates that the extra cost of undergrounding averages $150 plus $2 per frontage foot; approximately $250 for a 50-foot lot. If transformers are required to be placed underground additional costs rise by about 25 percent. If the extra cost over and above standard overhead service is provided by a capital contribution from the customer, directly or indirectly, then no discrimination exists.

When and if underground service becomes the new standard throughout a municipality then the capital contribution should no longer be required. We are not suggesting that a policy of undergrounding distribution systems is to be discouraged—quite the contrary. Our concern is solely with the method by which such improvements are financed, and we recommend that:

> ***4.24 The cost of a standard overhead system be included in the retail rates, with any additional cost for a higher value underground system to be borne by the new customers.***

Promotional allowances

A questionable practice of some municipal utilities is the custom of offering rebates and promotional allowances to builders to ensure the construction of all-electric homes and apartments. Practices vary, but one popular scheme is to rebate the difference between the actual cost of underground and overhead service facilities if the building is all electric, and a lesser portion if electric water heaters are installed and the building is heated by oil. Anyone using a fuel other than electricity or oil must pay the full additional cost of undergrounding.

The practice of builder rebates is justified by some municipal electric utilities, first on the grounds of competition with gas companies, which offer similar schemes, and second by the argument that margins earned on the higher consumption will, over time, recover the cost of the rebate. But according to Hydro's own studies, revenues from the sale of residential electric space heating may no longer be covering the incremental costs associated with the service, not to speak of providing a margin to recover the cost of any rebate to the builder. Therefore these practices should not be attractive to the distribution utilities.

From the standpoint of the energy suppliers, builder promotions are a zero sum game; the developers are the only obvious beneficiaries. Judging by their brief to Task Force Hydro the gas and petroleum companies are fully aware of this. "The public interest would be better served," the Gas and Petroleum Association of Ontario observes, "and all customers would benefit if the marketers of various fuels were left to compete on the basis of capital costs, operating costs and preferred energy uses." We believe that this argument applies equally to the distributors of electrical power, and provided that the oil and gas companies are in fact prepared to discontinue all such promotional allowances, Hydro should do likewise.

Since these matters do not all fall solely within Hydro's purview, we recommend that:

> ***4.25 Means be sought to eliminate the practice in the energy industry known as "builder promotions".***

A second controversial aspect of Hydro's marketing program is its policy of guaranteeing mortgages on electrically heated homes and loans to developers for the financing of services for such homes. The contingent liability represented by the second mortgages and loan guarantees is currently less than a million dollars and thus not a significant sum in relation to Hydro's financial reserves. Hydro contends that the program was introduced to counter similar practices by its competitors. Nevertheless it does raise questions as to the marketing practices which are appropriate for a public agency.

Interruptible Discounts to Large Industrial Customers

Interruptible customers on the Hydro system buy power on the understanding that up to a specified portion of their load may be cut off on short notice when the generating capacity is needed in order to meet the requirements of "firm" customers. This reduces both Hydro's reserve and peak generating requirements and operating costs and customers are compensated accordingly.

Since 1961 Hydro has offered two main classes of interruptible power, "A" and "B", to its direct industrial customers. Except under extended emergency conditions Hydro agrees to interrupt service to "A" class customers not more than five to ten times annually for periods of up to two hours, normally with two hours advance notice. Class "B" power may be interrupted more frequently and with only 5 to 10 minutes notice. Currently interruptible "A" power discounted $8.64 per kW/yr and interruptible "B", $12.48. These reductions amount to discounts from the firm power demand charge at 115 kV of 26 percent and 38 percent, respectively. Only large industries, capable of sustaining cuts of 5,000 kW or more, are eligible for interruptible discounts under "A" and "B" contracts. Another class, referred to as bulk interruptible, is available to direct industrial customers in blocks of not less than 20,000 kW under conditions essentially similar to those applying to class "B" interruptible. As yet there have been few takers.

In a recent decision, Hydro approved the offering of interruptible "A" to industrial customers of the municipal utilities contracting for a minimum of 10,000 kW of interruptible load and a like amount of firm power. This is a step in the direction of the equal treatment of large industrial loads across the Province, whether the supply source is Hydro directly or the utilities.

Total load subject to interruptions in 1971 was approximately 500 MW, but only 268 MW was available for interruption at the time of the 1971 peak. Even so, by dumping the interruptible load, Hydro could have lost the Keith G.S. at Windsor during last winter's peak day without creating significant problems for the system.

Planned interruptions to the system were as follows in 1970-71:

TABLE 25

INTERRUPTIONS TO "A" AND "B" CUSTOMERS, 1970-71

	Total Hours		Percentage of Hours in Year		Percentage of Hours Permitted by Contracts	
	"A" (25 & 60 cycle)	"B" (60 cycle)	"A"	"B"	"A"	"B"
1970	2.5	108.0	0.03	1.23	0.19	8.2
1971*	5.25	68.0	0.06	0.78	0.40	5.2

*First 8 months

Class "A" customers normally are interrupted only in case of emergencies, as one might expect, less than 1 percent of cuts allowable under existing contracts actually being made. Hydro states that "B" service, on the other hand, is regarded by its load despatchers as operating reserve, and this impression is fortified by the very sizeable discount allowed from firm demand rates. We note that "B" customers are interrupted infrequently and that, on occasion, Hydro operates its combustion turbines at a cost of 20 to 25 mills/kWh before dumping them. Hydro's system planners defend the use of the gas turbines arguing that cutting off the "B" load is not a perfect substitute under some operating conditions.

Hydro establishes the interruptible discounts on the basis of sharing equally with the customer the savings in capacity and operating costs made possible by the right to interrupt. The resulting rates appear to be more favourable to Hydro's customers than those of comparable utilities (Table 26). TVA offers a single category of interruptible power, in blocks of 20,000 kW only, at a discount of 21 percent off the demand charge on the amount of demand interrupted. Interruptible 2½ percent of the time, it falls between Hydro's "A" and "B" categories in terms of the frequency and duration of allowable cuts. BPA offers a 6.5 percent discount from the firm demand rate. B.C. Hydro does not offer interruptible power and Hydro Quebec has indicated that they plan soon to introduce the option for the first time.

TABLE 26

POWER RATES FOR LARGE INDUSTRIAL LOADS
ONTARIO HYDRO VS. TVA
1969 & 1973

	Load Factor	Firm (Mills/kWh)		Interruptible* (Mills/kWh)	
		1969	1973	1969	1973
TVA	100	4.43	6.62	4.22	6.09
	95	—	6.77	—	6.21
	85	4.70	7.11	4.46	6.48
Ontario Hydro (Freq. Assessed)	100	5.73	7.28	5.33	5.92
	95	—	7.49	5.46	6.06
	85	6.21	7.99	5.74	6.39
Ontario Hydro (Non-Freq. Assessed)	100	5.43	6.98	5.02	5.61
	95	—	7.17	5.13	5.73
	85	5.85	7.63	5.38	6.03

*TVA—98 percent availability 1969
97.5 percent availability 1973
Ontario Hydro—Interruptible "B"

Hydro periodically reviews the terms and conditions for interruptible service. However Task Force Hydro has had an indication from a direct customer with a large furnace load that for an appropriate discount he would consider rescheduling his operations so as to avoid the daily peak. Figure 9, which depicts Hydro's load curve on a typical winter day, reveals a fairly pronounced late afternoon hump which would suggest that such a rescheduling would be helpful. But with much of the system's hydro-electric generation having been designed to provide peaking capacity, any substantial success in shifting the late afternoon peak loads to other daytime periods would find the present system short of capacity designed to meet it efficiently. The flatness of the daytime thermal generation load curve shown in Figure 9 indicates that there is very little thermal plant available. The nighttime valley remains available, but Hydro reports few takers for "valley hour" power. Admittedly Hydro does not advertise the availability of discounts for such service.

TVA now offers a category of load which may be cut for up to 12 hours every day for several days at a time during the cold winter months. Perhaps, with proper promotion and appropriate discounts, certain large Ontario industries might be induced to close down for maintenance work or winter vacations during such periods.

Above all it is important that the terms and conditions of interruptible service can adjust to meet the ever changing requirements both of the Hydro system and of its customers. Because decisions regarding alternative reserve margins and capital construction programs over the next decade could involve differences in capital requirements measured in billions of dollars, we recommend that:

> ***4.26 Hydro extend every effort to reduce its reserve margin through the promotion of interruptible power contracts.***

Footnotes

[5] Ralph Turvey, *Optimal Pricing and Investment in Electricity Supply*, London: George Allen & Unwin, 1968.

[6] *Ibid.*, p. 106

[7] William G. Shepherd, "Marginal Cost Pricing: First Steps in American Electric and Telephone Rates," *Public Utilities Fortnightly*, July 21, 1966.

SYSTEM LOAD
TYPICAL WINTER DAY
Friday, Jan. 14, 1972

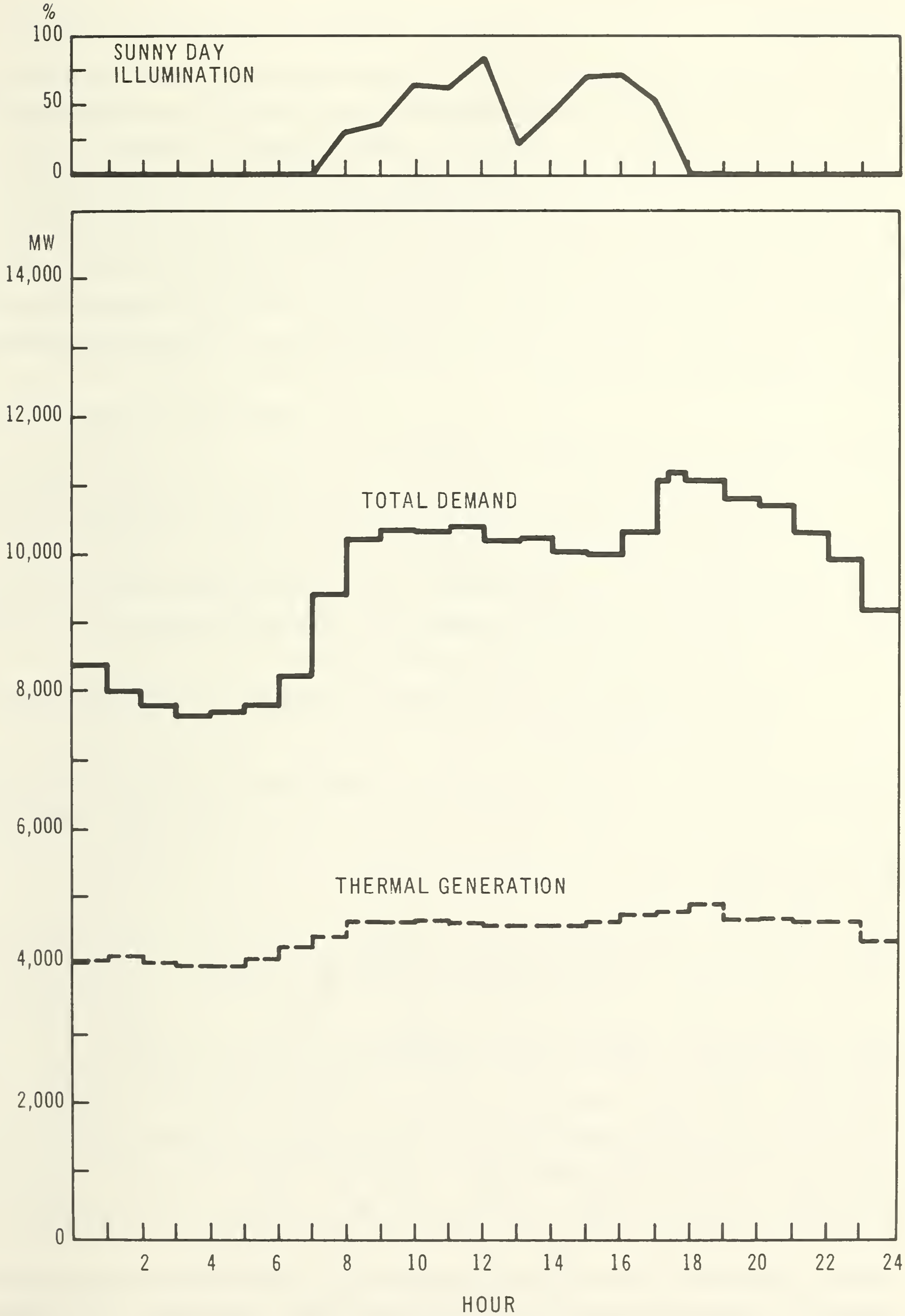


FIGURE 9

SECTION IX

RATE REVIEW AND APPEAL PROCEDURES

Introduction

Hydro is empowered by the Power Commission Act to establish electricity rates for its customers and the Commission constitutes the only court of appeal. Although the Act requires that rates charged by the municipalities be based on cost it leaves the definition of that cost largely in Hydro's hands. For example the Act provides no guidelines governing the establishment of rates to the directly served industries. Given the absence of an external appeal procedure, the enormous complexities associated with fair power costing and equitable rate design, all coupled with sharp overall increases in costs in recent years, it is small wonder that Hydro has difficulty in convincing others of the justice of its case.

Hydro has taken some steps to improve its public image in these areas through such customer relations activities as:

- information programs, through the media and by enclosing material with electricity bills.
- substitution of monthly for quarterly or bi-monthly billing in the power district to reduce the size of individual bills. Some municipal utilities have followed suit.
- improved procedures for handling complaints via letter, telephone or direct interviews.

During the course of this study we have gained the impression that Hydro itself recognizes that these efforts are not seen by the public to be sufficient and that some independent court of appeal on rates may be the only satisfactory solution.

There are two classes of issues in the power costing and rate setting area that in our view are likely to be of greatest interest to power customers and to the public. First are the issues that relate to Hydro's overall power costing, rate and financial policies. For example, some feel that Hydro and the municipal utilities place excessive emphasis on system reliability, or that methods of financing impose too heavy a burden on today's customers, or that the organization is insufficiently cost conscious. Another major area of concern, as we have discussed earlier, is Hydro's cost allocation process, in particular the cost pooling concept whereaby rates to primary customer groups are equalized across the Province.

The second class of issues is administrative in nature, arising when a specific injustice is alleged to have occurred. For example, a customer may dispute his rate classification, the accuracy of his meter, or the interpretation of

Hydro's policy on density requirements in the case of his application for service. The quarrel is not with the policy itself but in the manner of its application.

The Need for Revisions to Existing Procedures

In respect of rate regulation, Section 96 of the Power Commission Act gives Hydro the responsibility for approving and controlling all rates and charges applied to the ultimate user. The contractual arrangements which Hydro has with its municipal and direct industrial customers leave Hydro to determine the basis of billing and provide that Hydro be the sole authority and arbitrator in any dispute. Section 93 does provide for the appeal of rates by customers but only to the Hydro Commission. However, the Commission has never exercised the option to convene rate appeal hearings, and in any event such hearings, if conducted by Hydro itself, would not in our view be seen by the public as sufficient to instill confidence in the fairness of Hydro's practices and procedures.

We recognize the influence of the municipal utilities, acting through the Ontario Municipal Electrical Association as a desirable form of internal check and balance. It is the business of the O.M.E.A. to review power prices in the interest of the municipal utilities and the 1,800,000 retail customers they represent. The effectiveness of the O.M.E.A. as a representative of power customers is limited since it does not represent nearly 650,000 customers of the power district, including many of the Province's largest industries. The O.M.E.A. can however continue to perform a useful service as a representative of its member municipal utilities but as long as it does not speak for the direct and retail customers of the power district it cannot provide the broadly based public forum and rate appeal mechanism that is needed in Ontario today.

The involvement of the government in Hydro rate issues is also important. Inevitably announcements to raise electricity rates attract wide public attention leading to debate in the Legislature and the appearance of Hydro before committees of the Legislature. These appearances have been unsuccessful for two reasons:

- there has been insufficient time available for Hydro to fully explain its position.
- members of the Legislature have stated that they lacked the technical knowledge and guidance to ask the relevant questions.

A New Structure for Rate Review

In the Organization Study we recommend the creation of an Office of Public Affairs. We expect that this office, in concert with Hydro's line organization, will be able to resolve the administrative issues that we have described above.

On the other hand, we have concluded that a review process, independent of the Hydro organization, is required to resolve the first category of issues, and particularly the rates issue. We therefore recommend that:

> 4.27 ***There be established an Electricity Rate Review Board, appointed by the Lieutenant-Governor in Council, to publicly hear appeals and review proposals for changes in wholesale and direct industrial rates and to review the principles underlying the establishment of retail rates across the Province.***

The Advisory Committee on Energy has recommended the establishment of an Ontario Energy Commission as a senior advisory body to develop and make energy policy recommendations to government. Should such a body be established, we suggest that the Rate Review Board report to it. Such an arrangement would enhance the degree to which the Board will be perceived by the public as a body independent of the Hydro Corporation.

In Report Number One we suggested that the Hydro Board have authority "to approve the policies for allocation of the cost of power and rate structures for both wholesale and retail sectors". In our view, therefore, the authority of the Rate Review Board should be confined to hearing evidence and delivering an independent opinion on matters falling within its jurisdiction. Although these opinions will be reported directly to a body other than Hydro, they would be conveyed publicly to the Hydro Board. As we will explain later, the Hydro Board would come to a decision on rate matters taking into consideration the opinion of the Rate Review Board.

Further, in Report Number One we argued that a traditional regulatory board would be inappropriate in that it would duplicate the regulatory functions and expertise we are seeking to embody in the new Hydro Board and which already exists in the several ministries of Government with an interest in Hydro affairs. We are therefore concerned that steps be taken to ensure that the Rate Review Board not be allowed to develop into a large organization. We envisage a body of not more than five with a rotating membership based on term appointments, and supported by a small staff. Operating costs, including consulting services, should be charged to the provincial consolidated revenue fund, but recovered from the Hydro Corporation.

The primary purpose of the Rate Review Board should be to provide an objective public review and independent opinion on electricity rate matters. It would provide a public forum where Hydro's applications for power rate increases could be debated and interventions be made by Hydro customers and the public at large. We also envisage the Rate Review Board hearing appeals regarding Hydro policy and procedures relating to power costing and rates. In the event of an appeal or intervention by an individual customer or group of customers, the Rate Review Board would be empowered to hear testimony from both the appellant and the Hydro Corporation and to call

as witnesses officers of Hydro, civil servants or outside experts as it deemed appropriate.

If carefully structured, such a review process should provide for a workable process on issues which are bound to become more contentious in future. It should provide Hydro with the forum it has hitherto lacked to present its case to the public, without infringement on vital corporate prerogatives. Whether the public will see the process as sufficiently independent of Hydro cannot be determined in advance. Success will depend largely on the calibre of the individuals chosen to be members of the Rate Review Board.

We believe that a distinction can be drawn between two set of issues which will face the Rate Review Board. The first would relate to the justification of increases in bulk power charges to Hydro's primary customers, the second with policies, procedures and components of cost that relate to the cost allocation and rate-making process.

Increases in the bulk power rate

Under current contracts, the direct industrial customers of Hydro must be advised sixty days prior to any rate adjustments, which have traditionally gone into effect on January 1st. In the interest of the general public the municipal utilities should also continue to be given reasonably early warning of bulk power price changes. However, it is our view that bulk power rate adjustments are of such economic importance to the Province that there should be public hearings and adequate time to debate fully the relevant questions. On the other hand it is essential that hearings on the bulk power rate proceed with dispatch, since it is important to ensure that where an increase is justified, unreasonable delay not be allowed to impair Hydro's financial position. In addition the Rate Review Board must be prepared to hear appeals or intervention on any matter to do with power costing and rate philosophy once its opinion on the bulk power application has been rendered. On the basis of these further hearings, the Rate Review Board may recommend changes in Hydro policy that would, if adopted, govern future hearings on bulk power increases.

In this context, we suggest that there be a standard timetable or schedule, perhaps along the lines of the following example, for reviewing Hydro proposals for a bulk power rate increase.

Time	Lapsed Time in Months	Action
8 months prior to effective date of rate increase	0	Hydro files a brief with the Rate Review Board substantiating the need for an increase in bulk power rates to take effect in 8 months. The Review Board announces the hearing.
30 days after Hydro's application	1	Public hearing begins. First to be heard, Hydro presents its brief, followed by interveners and expert witnesses.
90 days after the hearings begin	4	Rate Review Board delivers to the Ontario Energy Commission its opinion regarding the proposed rate increase. The opinion is delivered publicly, a copy being conveyed to the Hydro Board for its information.
30 days after Rate Review Board opinion is published	5	The Hydro Board publicly announces its intention to raise bulk power rates in 3 months' time. Notice of this intention is delivered formally to the Minister responsible for Hydro. The Minister may within 30 days instruct Hydro to withhold or modify the proposed increase in which case he would make a public announcement to this effect.
30 days after Hydro's announcement	6	Hydro announces the bulk power rate and formally notifies its wholesale customers of the rate which is to be effective in 2 months' time.
90 days after Hydro's announcement	8	Bulk power rate becomes effective.

Three bodies—the Board of the Hydro Corporation, the Rate Review Board and the Ontario Energy Commission would each view the application for power rate increases from different perspectives, but there is no *prima facie* reason to believe that they would not normally reach similar conclusions. In practice, it is not expected that the Hydro Board would establish rates at variance with those reflected in the opinion of the Rate Review Board. If it did so it would have to be on the basis of clear evidence that its decision was in the best interest of the delivery system and the Province generally. Our conception of the Rate Review Board is that it be independent. Thus there is the possibility that the opinion of the Board could, in the view of the Ontario Energy Commission be at variance with provincial energy policy. Should such a situation arise, we assume that the O.E.C. would give its own advice to

the Minister. A virtue of the system is that it requires intervention by the Minister only when he is convinced that Hydro's proposed rate increase is not in accord with the best interests of the Province as a whole.

It is suggested that the Rate Review Board require Hydro to present arguments in support of rate increases, not only for the year under review, but for the two succeeding years. Such a procedure, similar in some respects to that used in the Province of Quebec, could help to establish a continuing process of review upon which Hydro annually could establish its rates. With this rolling forecast, intervenors would have a clearer view of emerging Hydro rate levels and the need for exhaustive review every year would be reduced, leaving more time to consider the underlying policy issues.

Power costing, rate policy and financial issues

If the hearings on the bulk power rate are to be conducted in accordance with a schedule as we have suggested, there will be insufficient time to resolve many policy issues raised by the interveners. As indicated, the review of Hydro's case for a rate increase will be conducted within a policy framework which includes many "givens"—the rate of return, for example.

Such unresolved issues may include a re-examination of any of these "givens", and will encompass principles of allocating bulk power costs among primary customer groups, Hydro's retail rate philosophy and those of the municipal utilities, the financial policies which should apply throughout the system and such technico-economic issues as the proper determination of service levels and reserve margins, which are directly and importantly related to the cost of power. Of course, with almost two and a half million ultimate customers and 353 distributing utilities in the Province, the Rate Review Board may not be able to hear every appeal on, say, retail rate principles that is brought before it. Pre-selection will be necessary to isolate cases of unusual significance or generality. These issues may be debated in open hearings along the lines above described, with interveners cross-examining Hydro witnesses. The reporting process described above would also be unchanged.

SECTION X

GENERATION RESERVE MARGINS

Hydro's capital construction program calls for the capacity margin over firm demand to increase from roughly 16 percent in 1970 to about 29 percent in 1977 which will add an additional 2,350 MW of capacity over that period. As we note in Section VI, rising reserve margins will be a major contributor to the forecast increases in bulk power costs to 1977. As rates become a matter of public review, it is clear that Hydro's reserve margin will in future come under much closer public scrutiny.

In Report Number One we observed that "reliability of supply . . . is a fundamental consideration in electric power planning". With respect to the establishment of generation reserve margin, we also pointed out that "cost/benefit relationships are highly technical and, therefore, Government must rely to very large extent on advice from Hydro". Accordingly, we put forward Recommendation 1.3b to the effect that "Hydro be directed . . . to maintain those standards for reliability which are agreed upon from time to time by the Government and Hydro". This in effect means that the Government and Hydro jointly should determine the level of the reserve margin. The reliability of the generation and bulk transmission systems is determined principally by two factors:

- The availability of the generation system, i.e., whether a sufficient number of generating units is available to supply the load, as opposed to being out of service due to breakdown, scheduled maintenance or other cause, and
- The security of the bulk transmission system, i.e., whether the transmission components have the ability to withstand sudden shocks due to breakdown or malfunction of equipment, natural phenomena such as lightning, or operating error.

There are numerous factors affecting the availability of generation, the most important of which are the following:

- The dependability of generating units. These are subject to breakdown to varying degrees depending on size, type, design and quality of components.
- Equipment failure due to adverse weather conditions and other natural causes.
- Reliability of supply of critical materials such as fuel, heavy water, etc.
- Delay in construction of new generation or transmission facilities.
- Changes in governmental regulations reducing Hydro's freedom to use its facilities as designed.

- Errors in operating and maintaining equipment or strikes by operating staff.

In Ontario Hydro, as in many other utilities, the generation reserve margin is established on the basis of the computed probability that the available generating capacity will be greater than the load. Two important uncertainties are accounted for in this computation; the magnitude of the load and the generating capacity available. The former is the total demand which varies continuously from hour to hour and from day to day, and the latter is the total capacity minus that capacity not available due to random equipment failure or equipment out of service for routine maintenance.

In determining the loss-of-load probability, it is necessary to consider more than just the annual peak load on the system since the loss of load probability is a function of both the available capacity and the load characteristics of the system. Using simulation models, Hydro has established the probability for conditions under which load might exceed available generation. The index of reliability adopted by Hydro is similar of that for many other North American utilities. This index assumes a loss of load occurring on the average once in ten years.

This index of reliability is the criterion for design and operation for the interconnected power systems for the Northeast Power Coordinating Council of which Ontario Hydro is a member. The NPCC forecasts gross reserve margins as a percentage of load for the years 1973-81 ranging from a minimum 28.3 percent to a maximum 32.5 percent. Due to difficulties which face utilities in the United States in obtaining approvals for new generation and transmission, it is questionable whether in fact these gross margins will be achieved. Two interesting points therefore arise in the Ontario context.

- It is unlikely we can rely on assistance from neighbouring U.S. utilities as a means of reducing Ontario Hydro's generating capacity.

- If Ontario Hydro achieves reserve margins currently forecast, these could be greater than those carried by neighbouring U.S. utilities.

In a recent study, Hydro estimated the cost savings that might accrue if a loss of load was assumed, on the average, once in one year. The results were as follows:

- Reduction in capacity margin of 5 percentage points.

- A reduction of capital borrowing of $1 billion or 4 percent of the total borrowing requirements to 1986; a present value of capital and operating savings of $700 million.

- An average annual bulk power saving of $3.00 per kW.

A question which cannot be easily answered is whether a saving of $1 billion in capital over the next 13 years, which translates into a 2 percent reduction in power bills over the period, is worth the tenfold increase in the risk of failing to meet peak demand.

In the above calculation, no allowance was made for the sale of the "unneeded" reserve, or that capacity not required at any particular point in time. In recent years, there has been a ready market for such surplus capacity and there is good reason to believe that this will continue, so that surplus power sales on a week-to-week basis could provide a significant offset to the cost of carrying the reserve. It is extremely important that the charge for such power be reviewed, especially in light of the possibility that Hydro's reserve margin could be substantially higher than that of its neighbours.

Hydro is continually seeking ways to improve operating and maintenance techniques and to increase the in-service availability of equipment. Continued efforts along these lines are extremely important since the loss-of-load probability is based on actual operating experience which means that improved experience would justify lower reserve margins.

Because of the large capital and operating costs involved in building and operating reserve capacity, and because of the impact of electricity generation on the environment, we recommend that:

4.28 (a) Generating reserve margins be reviewed periodically and established by agreement between the Ontario Government and Hydro.

(b) Hydro continue its efforts to improve the in-service availability of generating equipment with a view to reducing reserve margins.

SECTION XI

SUMMARY OF RECOMMENDATIONS

REPORT NUMBER ONE: HYDRO IN ONTARIO— A FUTURE ROLE AND PLACE

Task Force Hydro recommends that:

HYDRO'S ROLE

1.1 (a) Ontario Hydro be responsible to the Government of Ontario for the generation, transmission and distribution of electric energy in the Province.

(b) Ontario Hydro discharge this responsibility in compliance with the overall policy of the Provincial Government.

(c) Except where economic considerations dictate otherwise Ontario Hydro delegate its responsibility for the distribution of electric energy to utilities that are agents of municipalities.

1.2 Hydro be a delivery agency of the Provincial Government receiving broad policy direction from the Government through the Provincial Secretary for Resources Development.

1.3 Hydro be directed through the Provincial Secretary for Resources Development:

(a) to meet demand for electricity in Ontario at the lowest feasible cost.

(b) to maintain those standards of reliability which are agreed upon from time to time by the Government and Hydro.

1.4 Hydro exploit its technology through developing and pursuing policies to share its technological expertise with the private sector.

1.5 As a general rule, the additional costs incurred for environmental concerns be included in electricity prices.

1.6 Hydro actively participate in the development and support of Government policies with respect to energy and the environment.

1.7 Hydro's marketing policy be designed specifically to support Provincial energy and environmental policy and, within the limits thereby imposed, to ensure the most efficient use of the system's capital facilities.

1.8 There continue to be close coordination between Hydro and the Ministry of Treasury, Economics and Intergovernmental Affairs in financial matters.

1.9 In the event that Hydro should be required to support regional development or contra-cyclical construction policies, the additional costs of so doing should not be built into power prices but should be borne by subsidy from the Provincial Treasury.

HYDRO AND THE PUBLIC

1.10 Hydro establish a procedure whereby representations and appeals from the public can be heard by a body responsible to the senior policy making body of Hydro but not a part of the line organization.

1.11 There be no requirement for the consent of the Minister of Justice and Attorney General to bring an action against the Hydro Commission or any member of the Hydro Commission.

1.12 Hydro consider the establishment of ad hoc citizens' task forces to provide for citizen participation in the locating of generating and transmission facilities and in other matters of concern to the public.

1.13 Responsibility for the establishment of electrical safety standards be transferred to an agency of the Ontario Government other than Ontario Hydro, but responsibility for the actual inspection function continue to rest with Hydro.

HYDRO AND THE PROVINCIAL GOVERNMENT

1.14 *Government policy, defining the broad objectives and constraints within which Hydro must operate, be specified by the Lieutenant-Governor in Council.*

1.15 *To give expression to Government policy for Hydro and to define Hydro's mandate, a contract be drawn up between the Provincial Government and Hydro.*

1.16 *Government policy for Hydro that is not defined by Orders-in-Council or by the Government-Hydro contract be determined by the Provincial Secretary for Resources Development in consultation with the senior policy body of Hydro.*

1.17 *Hydro be directed to pursue other objectives which may be established from time to time by the Lieutenant- Governor in Council.*

CORPORATE STRUCTURE

1.18 *Ontario Hydro be designated as a Crown Corporation to be known as the Hydro Corporation of Ontario or Ontario Hydro.*

1.19 *The Board of the Hydro Corporation be empowered to deal with the Government on behalf of the total delivery system so as to facilitate consistent policy direction for the total system.*

1.20 *The Hydro Corporation Board consist of eleven members appointed by the Lieutenant-Governor in Council as follows:*

- *a Chairman, for a five year term, renewable*
- *the President of the Hydro Corporation, ex officio*
- *two representatives from nominations submitted by the Board of Directors of the Ontario Municipal Electric Association, for three year terms, twice renewable.*
- *two senior civil servants*

- *five members-at-large to be named from outside the delivery system and government and to be selected for expertise in industrial, corporate, economic or other matters relevant to Hydro, appointed for three year terms, twice renewable.*

1.21 *The Chairman be appointed on a full time basis and his orientation be outward to the Ontario community and to the Government and that, with his Board, he focus on the translation of Government policy into consistent and achievable corporate objectives and policies.*

1.22 *The President be responsible to the Board of Directors for directing the affairs of the Corporation in accordance with goals and objectives established by the Board.*

HYDRO AND THE UTILITIES

1.23 *Ontario Hydro be directly responsible for the management of that part of the delivery system which generates and transmits bulk power.*

1.24 *The division of responsibility between the wholesale and retail functions be drawn at the main secondary bus-bar of the transformer station.*

1.25 *Municipal utilities be rationalized into upper tier regional utilities where and as new municipal government is implemented.*

1.26 *The area to be served by the regional utility be the entire area served by the municipal government.*

1.27 *A first step toward rationalization encompass those areas of the Province that now have new municipal governments, with the experience thus gained to guide future steps.*

1.28 *Those responsible for planning the rationalization of the retail system attempt to achieve some rationalization of utilities which do not lie within areas soon to be under the jurisdiction of new municipal governments, including the private utilities.*

1.29 The commissioners of regional utilities be appointed by the municipal council from outside the council with the exception of the chairman of the council who shall be a member ex officio of the commission.

1.30 The Hydro Corporation give effect to its policy and that of the Provincial Government through contracts with each utility, such contracts to reflect a working agreement between the Corporation and the utility.

OWNERSHIP

1.31 Control and ownership of the Hydro Corporation continue to reside with the Government of Ontario, but the interest of the municipalities be established and defined as follows:

- *An equity account be established on the balance sheet of the Hydro Corporation as an item to replace the "equities accumulated through debt retirement charges" and certificates be issued to the participating municipalities and to the Corporation as trustee for the power district for their proportionate shares therein.*

- *The certificates be described as non-voting participating shares in the equity account of the Hydro Corporation (equity account shares) and new certificates be issued annually to represent the changing interests of each participating municipality and the rural power district in the same manner as the debt retirement charges have been apportioned annually in the past.*

- *The certificates entitle each participant holding such certificates to receive on the liquidation or winding up of the Hydro Corporation a share proportionate to the dollar amount of the certificates held of the surplus funds realized on liquidation after payment or provision for payment of all debts and obligations of the Hydro Corporation.*

ORGANIZATION

1.32 Once the Government has established a redefined mandate for Hydro the senior governing body of Hydro require management to submit for its approval a detailed plan and timetable for an approach to organization.

REPORT NUMBER TWO: HYDRO IN ONTARIO— AN APPROACH TO ORGANIZATION

Task Force Hydro recommends that:

INTERIM ORGANIZATION

2.1 *The organization concepts developed by Task Force Hydro's Organization Study Team be adopted by Hydro as an approach to organization in fulfillment of the new role and place as approved by the Government of Ontario.*

2.2 *As an initial step toward a new organization, Hydro establish a Corporate Office and a Divisional structure based on the four missions identified by the Organization Study Team, viz; Design and Construction, Generation and Transmission, Distribution, and Supply Services.*

APPROACH TO A NEW ORGANIZATION

2.3 *Hydro initiate further studies, using external resources where necessary, to plan the organization structure best suited to its new Role and Place and to develop the highest possible level of productivity and efficiency.*

PUBLIC RESPONSIVENESS

2.4 *Hydro establish an Office of Public Affairs headed by the Director of Public Affairs responsible to the Board for hearing grievances relating to services to the public rendered by Hydro and the distribution utilities.*

2.5 *The Director of Public Affairs place himself at the disposal of members of the Legislature to ensure rapid and effective response to questions and complaints submitted by constituents about Hydro or the distribution utilities.*

2.6 *Ontario Hydro planners, in collaboration with Government at the provincial and local levels and with interested individuals and citizen groups, develop an open planning process to produce economically and technically feasible plans for transmission and generation facilities acceptable to the public and with minimum adverse environmental impact.*

REPORT NUMBER THREE—NUCLEAR POWER IN ONTARIO

Task Force Hydro recommends that:

ENVIRONMENTAL QUALITY IMPLICATIONS

3.1 *Ontario Hydro, in co-operation with Government agencies, continue to pursue a vigorous program of research and engineering development in environmental and human protection in connection with all aspects of nuclear power plant operation, including the long-term storage and disposal of spent nuclear fuel.*

FUTURE NUCLEAR POWER PROGRAM FOR ONTARIO

3.2 *Nuclear power stations be of the CANDU-PHR type unless future studies and assessments reveal that some alternative type will more closely meet the needs of the Province of Ontario.*

3.3 *In recognition of the need to gain more operating experience and confidence with existing types of CANDU reactors and more knowledge of the economies of multiple unit manufacture, changes in design and type be resisted unless clear economic advantages can be demonstrated.*

3.4 *Ontario Hydro continue the assessment of other nuclear power reactors.*

3.5 *The existing arrangements under which A.E.C.L. undertakes basic research in support of the nuclear power program of Ontario Hydro be replaced with formal agreements.*

3.6 *There be agreements between A.E.C.L. and Ontario Hydro relating to the sale by A.E.C.L. of designs, drawings, reports and manuals of Hydro's nuclear generating stations.*

STRATEGIC RESOURCES

3.7 *Formal steps be taken through contractual arrangements to ensure that Ontario Hydro has an assured supply of natural uranium to meet the potential requirements of its nuclear power program, up to at least the year 2000.*

3.8 *Appropriate steps be taken to ensure that adequate heavy water is available in time to satisfy Ontario Hydro's planned CANDU nuclear program and to support the further commitment of CANDU reactors in Ontario and elsewhere.*

3.9 Ontario Hydro give consideration to constructing and operating heavy water production facilities adequate to assure its own supplies.

3.10 Ontario Hydro support the design, construction, and operation of CANDU reactors outside its own system by making available on reasonable terms experienced personnel but not to an extent that would prejudice its own nuclear power program.

3.11 Ontario Hydro explore the possibility of joint ventures with private enterprise to further other sales of CANDU.

3.12 Ontario Hydro arrange annual briefing sessions to inform industry concerning its nuclear power program.

DEVELOPMENT OF FOREIGN MARKETS

3.13 The Federal Government be urged to expand its campaign to sell CANDU reactors in Canada and abroad making use of all resources available not only within its own jurisdiction but also those in Provincial Governments and the private sector.

3.14 The Federal Government be urged to examine the feasibility of offering long term fuel and heavy water supply contracts to foreign purchasers as an added incentive to buy CANDU reactors, subject to a requirement for security of domestic supplies and present commitments.

EDUCATION AND INFORMATION

3.15 Programs in applied science and engineering related to nuclear technology be established in selected universities and colleges within Ontario.

3.16 (a) Ontario Hydro's Nuclear Training Centre offer selected employees of Canadian utilities and the Canadian nuclear industry short courses of two to four weeks' duration in nuclear power technology, with special reference to CANDU systems.

(b) The possibility of the Nuclear Training Centre becoming part of the Ontario educational system be considered.

3.17 To enhance the detailed knowledge of senior government personnel and industrialists with respect to nuclear power generation and to encourage dialogue between policy makers and nuclear scientists, short symposia be sponsored and organized by the Provincial Government and Ontario Hydro.

3.18 Ontario Hydro assume the initiative in the design and implementation of a major and sustained public information program related to nuclear power generation in order to improve the public's knowledge of nuclear technology and enhance its appreciation of the importance to the economy of Ontario of the effective exploitation of nuclear energy.

REPORT NUMBER FOUR: HYDRO IN ONTARIO— FINANCIAL POLICY AND RATES

Task Force Hydro recommends that:

FINANCIAL OBJECTIVES FOR HYDRO

4.1 The mix of internal and external funds be established with the objectives of minimizing the cost of capital over the long term.

4.2 Hydro take whatever steps are necessary to prevent any further increase in its debt/equity ratio.

4.3 Hydro take the initiative with Government in undertaking a periodic review of Hydro's financial performance, using rate of return on net assets as a principal criterion.

4.4 Surplus funds be retained by Hydro to be used at its discretion for debt retirement, rate stabilization, system expansion and to provide for contingencies.

4.5 Those sections of The Power Commission Act relating to the retirement of Hydro's debt be revised so that the only requirement is that debt be amortized over a period not in excess of 40 years.

4.6 The current charge to the cost of power for debt retirement be replaced by a charge sufficient to meet the requirements of the Corporation for internally generated funds for debt retirement and system expansion.

4.7 There be established on the balance sheet an "Accumulated Equities" account to replace the current "Equities Accumulated through Debt Retirement" charges and a "General Reserve" account to replace the "Reserve for Stabilization of Rates and Contingencies."

4.8 There be no requirement to fund any portion of the General Reserve.

HYDRO SECURITIES ISSUES

4.9 The provincial guarantee of Hydro's securities be retained.

4.10 Hydro put more emphasis on developing a market for debentures with maturities ranging from 3 to 10 years.

4.11 Hydro be prepared to sell or trade, as well as to buy its own outstanding issues as part of its debt management operations.

4.12 In addition to developing the Canadian market for its securities, Hydro continue to develop markets in the U.S. and other foreign countries.

4.13 Hydro develop a system for continuous appraisal of the performance of its financial syndicates including the managers.

FINANCING BY THE MUNICIPAL UTILITIES

4.14 Hydro and the municipal electric utilities together adopt a financial policy that seeks to minimize retail rates over the long term, through appropriate emphasis on debt financing and using rate of return as a principal criterion.

PRINCIPLES OF POWER COSTING

4.15 Both demand and energy components of the bulk power rate be reviewed annually and be adjusted as circumstances warrant.

4.16 The practice of paying a return on accumulated "equities" of the municipal utilities and the power district be discontinued.

4.17 The practice of issuing 13th bills to the municipal utilities be discontinued.

PRINCIPLES OF RATEMAKING

4.18 Ontario Hydro adopt a pricing policy that will more accurately reflect the supply cost of electricity, and that will give effect to government policies for the allocation of capital within the energy sector.

4.19 Ontario Hydro's research programs aimed at developing a uniform costing philosophy based on marginal costing be

expanded to embrace studies of the feasibility and acceptability of:

(a) bulk power and retail rates that vary with the time of day and season of year,

(b) demand charges that are based on a customer's load at the time of the monthly or seasonal system peak rather than on his individual monthly peak.

4.20 *Except where subject to controlled disconnections, special rates based on stipulated appliance ownership, such as all-electric or water heating rates, be phased out as quickly as possible.*

4.21 *Discounts reflecting savings in marketing and certain overhead costs be granted to all large industrial customers in the form of a step reduction in the demand charge above a selected blocking point, the cost of such discounts to be spread throughout the system.*

4.22 *Hydro reduce the number of standard residential and general service rate schedules to about 15 each, from which municipal electrical utilities would agree to choose in order to fulfill their revenue needs.*

4.23 *Rates and conditions of supply be made as uniform as possible for all industries in the Province above a 5000 kW load, whether served by Hydro directly or by other suppliers.*

4.24 *The cost of a standard overhead system be included in the retail rates, with any additional cost for a higher value underground system to be borne by the new customers.*

4.25 *Means be sought to eliminate the practice in the energy industry known as "builder promotions".*

4.26 *Hydro extend every effort to reduce its reserve margin through the promotion of interruptible power contracts.*

RATE REVIEW AND APPEAL PROCEDURES

4.27 *There be established an Electricity Rate Review Board, appointed by the Lieutenant-Governor in Council, to publicly*

hear appeals and review proposals for changes in wholesale and direct industrial rates and to review the principles underlying the establishment of retail rates across the Province.

GENERATION RESERVE MARGINS

4.28 (*a*) *Generating reserve margins be reviewed periodically and established by agreement between the Ontario Government and Hydro.*

(*b*) *Hydro continue its efforts to improve the in-service availability of generating equipment with a view to reducing reserve margins.*

APPENDICES

APPENDIX I

TASK FORCE HYDRO
MEMBERS OF THE STEERING COMMITTEE

CHAIRMAN

J. D. Muncaster
President and Director
Canadian Tire Corporation

H. A. Crothers
President
Crothers Limited

R. M. Dillon
Professor of Engineering Science
University of Western Ontario

A. Frame
Past President
Ontario Municipal Electric Association

D. J. Gordon
General Manager
The Hydro-Electric Power Commission of Ontario

J. K. Reynolds
Deputy Provincial Secretary for Resources Development

R. B. Taylor
Vice-President
The Steel Company of Canada Limited

CENTRAL STAFF

R. M. Dillon
Executive Director

J. B. Smith
Research Director

B. A. Baxter
Administrative Assistant

C. A. MacFarlane
Secretary

V. J. McAfee
Administrative Terminal Systems Operator

APPENDIX II

TASK FORCE HYDRO STUDY TEAMS

EXTERNAL FINANCING

Project Director

Dr. E. P. Neufeld	Professor of Economics Department of Political Economy University of Toronto

Members

J. O. Dean	Manager Financial Policy Research Ontario Hydro
C. G. Fullerton	Assistant Treasurer Ontario Hydro
G. McIntyre	Executive Director Treasury Division Ministry of Treasury, Economics and Intergovernmental Affairs
J. B. Smith	Group Manager Integrated Financial Planning Ontario Hydro

POWER COSTING AND RATE PHILOSOPHY

Project Director

Dr. W. W. Stevenson	Senior Economist Acres Consulting Services Ltd.

Members

E. G. Bainbridge	Director of Consumer Service Ontario Hydro (Special Advisor on Rate Policies)
E. H. Burdette	Manager Financial Forecasts Ontario Hydro
J. O. Dean	Manager Financial Policy Research Ontario Hydro
J. B. MacDonald	Manager Power Market Analysis Ontario Hydro

APPENDIX III

ADVISORY COMMITTEE ON FINANCIAL POLICY AND RATES

Chairman

A. J. G. Leighton	President Leighton and Kidd Ltd. Consulting Engineers, Toronto

Members

A. J. Bowker	Vice-Chairman, Power Costing Committee Ontario Municipal Electric Association, Ottawa
W. W. Buchanan	Chairman Anti-Dumping Tribunal, Ottawa
M. E. Fisher	Ontario President Consumers' Association of Canada, London
D. B. Ireland	Assistant General Manager Regions and Marketing Hydro-Electric Power Commission of Ontario, Toronto
R. A. Kampmeier	Consulting Engineer Financial and Rate Studies for Electric Power Utilities, Chattanooga, Tennessee
H. I. MacDonald	Deputy Treasurer and Deputy Minister of Treasury, Economics and Intergovernmental Affairs, Toronto
D. M. Seath	Vice-President Association of Municipal Electric Utilities, Stratford
A. R. Scott	Assistant Adviser, Electrical Energy Department of Energy, Mines and Resources, Ottawa
W. K. Voss	Vice-President Ontario Paper Company Ltd., Thorold
J. G. Young	Association of Municipalities of Ontario, Tilbury

Secretary

K. H. Kidd	Leighton and Kidd, Ltd. Consulting Engineers, Toronto

APPENDIX IV

GLOSSARY OF TECHNICAL TERMS

bulk power costs	—total annual cost of operating Hydro's bulk power facilities. Retail distribution costs are not included.
bulk transmission system or grid	—a network of interconnected power lines used to transmit electric energy at high voltages from power stations to load centres.
coincident peak of the power district	—the coincident peak loads used in the allocation of costs within the power district are based on coincidence factors which have been derived from the most recent 12 months actual data. Coincident peak is the sum of those loads which occur in the same demand time interval in which the group peak occurs. Coincident factor is the coincident peak load divided by the sum of individual peak loads.
costing load or billing demand	—the sum of the average of the 12 monthly peak demands (measured in kilowatts) for each member of the group of customers under review. Allowances for class diversity are made within the power district.
diversity factor	—the ratio of the noncoincident maximum demand or sum of the peak loads of individual customers and the coincident peak load for the group. It always exceeds unity.
elasticity of demand	—a measure of the degree to which consumption of a good or service changes with a change in its price or with a change in the income of potential consumers or with a change in the price of substitute goods and services.
energy	—that which is capable of doing work, equal to average power multiplied by a time interval.
firm power	—power intended to have assured availability to the customer to meet his load requirements.
interruptible loads	—loads which can be interrupted under contract provisions in exchange for which power is sold at a discount from the firm power rate.
kilowatt (kW)	—one thousand watts; a unit of electric power.

kilowatt-hour (kWh)	—a unit of energy equal to the work done by one kilowatt acting for one hour.
load	—the amount of power needed to be delivered to a given point on an electrical system.
load factor	—the relationship (expressed as a percentage) between the energy consumption and the peak load multiplied by the number of hours in a year.
megawatt (MW)	—one thousand kilowatts.
peak period (of day, year etc.)	—a designated interval of time during which the maximum average load is consumed or produced on a power system.
reserve margin (gross)	—the difference between dependable capacity and firm demand, expressed as a percentage of firm demand.

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